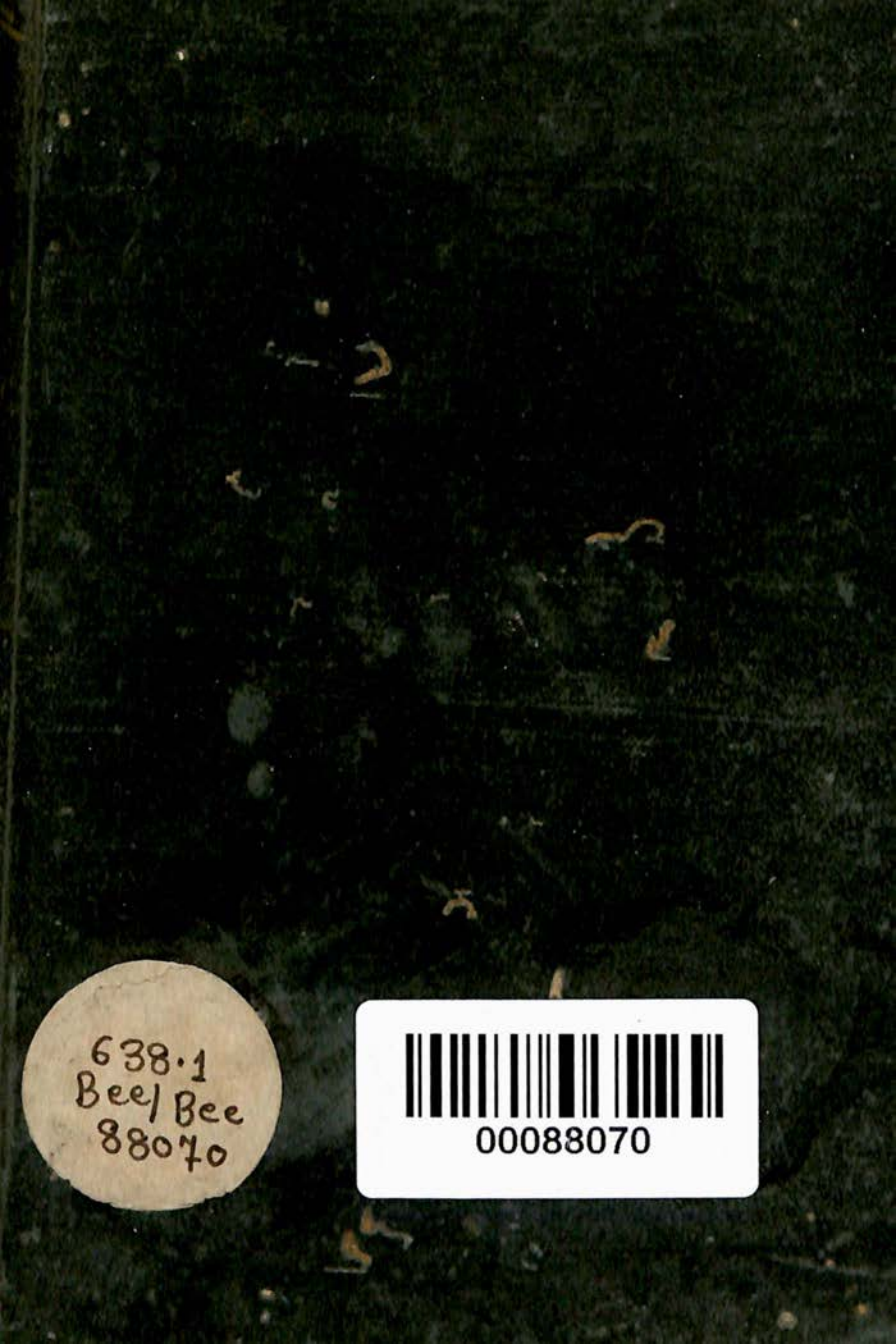
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BEE-KEEPING.

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BY

"THE TIMES" BEE-MASTER.

WITH ILLUSTRATIONS.

LONDON:
SAMPSON LOW, SON, AND MARSTON,
14, LUDGATE HILL.

1864.

[*The right of translation is reserved.*]

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PREFACE.

MY apology for writing a Bee-Book is as follows:—I sent *The Times* an account of a very successful honey harvest about the end of July, containing some observations on the treatment of bees, and the profits that might accrue to the cottager were he to take the right and humane way of taking honey from his hives. This communication appears to have interested many, for in consequence of it, persons desirous of information wrote to the Editor of *The Times*, requesting in confidence the name of the Bee-master, in order that they might correspond with

him. The Editor declined to give it up without my consent, which I felt it expedient to withhold. But to satisfy those who took so warm an interest in the subject, I addressed a series of letters to *The Times*, explanatory of some of the simplest elements of apiculture. These excited so great interest, that I received multitudes of letters addressed to "*The Times* Bee-master," which it was physically impossible to answer. But most of my correspondents complained of the obscurity and complexity of bee-books in general, and earnestly begged me to prepare a work they could understand and translate into practice. I have attempted to do so, strengthening my own observations by valuable extracts from the works of others. I am not, however, insensible to the great value, wide research, and real usefulness of the works I have carefully and long read. The first and most useful, as well as most beautiful modern work on bees, is "My Bee-Book," by the Rev. William Charles Cotton, M.A., student of Christ Church, Oxon. It is

profusely illustrated, and is the most genial and instructive work on bees it has been my lot to read. I have felt so great an interest in this good clergyman, that it often occurred to me to try to ascertain where he was and what he was doing. My own communications to *The Times*, among many interesting letters, brought me one signed "An Australian," which, though long, contains amid much interesting matter some notice of the author of "My Bee-Book." The reader will not, I am sure, complain of its length.

SIR,—It may be interesting to you, whose letters in *The Times* have so delighted me, to hear that my experience in *Australia* of the habits, instincts, and affections (if I may so apply the word) of your little favourites is identical with your own. From early childhood I shared my father's interest in his pets; and at one time I could have counted upwards of ninety hives in the two apiaries which he kept for his own amusement, and for the encouragement of those who were willing to keep bees. Everyone was welcome to a swarm who cared to ask for one. I

may give some curious facts as to the sagacity and gratitude of these insects. During the prevalence of the hot winds, it sometimes happens that the delicate comb melts, and the first indication is a stream of melted honey and smothering bees. I have been called to the rescue, and have taken up honey and bees in my hands, placed them in a basin of tepid water, and spread my fingers as landing-stages until all capable of restoration have plumed their wings and buzzed gratefully away, and so on until order and comfort was restored to the disturbed hive. I *never* was stung on any occasion whilst working amongst the bees, and only twice that I remember, and then by meeting an angry bee accidentally in the garden. The buzz of an angry bee is quite well known to their lovers. On one occasion a swarm met my sister, and actually began to settle on her hand and arm. She knew their ways, and walked very slowly on (of course surrounded by bees) until she found what she considered a comfortable bough, under which she held her hand. The queen adopted the suggestion, and after a few minutes' patiently standing amidst the confusion, she quietly retired, and, as *you* will believe, unharmed.

Of course we could not house all our swarms, so they

went off to the woods and found habitations in gum-trees hollowed out by the action of fires through the bush. I recollect one swarm, however, belonging to a neighbour, which preferred its old quarters, and actually built the combs and filled them with honey *suspended* from beneath the shelf upon which the hives were ranged in the open air. Its ultimate fate I do not remember.

Bees have many enemies in Australia; the greatest is probably the sugar-ant. To protect them from these intruders, we had the hives ranged on shelves, the supports of which stood in wide vessels of water, alike a protection against other foes. The apiaries were built open in front and ends, against a wall, with thatched roof and overhanging eaves; and there was a space between the shelf on which the hives stood and the wall, where one could sit or stand and watch them; for most of our hives were square, made of wood, with glass sides and wooden shutters; and the bees were so accustomed to be looked at, that they kept their side of the glass quite clean, and generally built a smooth surface of comb next the glass, leaving space to move between the comb and the glass; and I have often seen the queen, surrounded by her admiring subjects (exactly as you describe) making her pro-

gress across the comb, each attendant bee with its head next her majesty, fanning with its wings, and one could hear a *purr* of satisfaction.

The antipathies of the bee are very curious. I have known one individual who was chased perpetually round the garden, and I have seen him obliged to rush through a hedge to escape his little tormentors. Their feuds were sometimes most violent, and I have had to remove a hive from one apiary to the other, a distance of half a mile, to preserve the bees. Your plan of the super-hives is excellent. Most of our hives were square, and all of wood. The straw hives proved a harbour for insects, and deprived us of the pleasure of watching the bees at work. We used large confectioners' glasses as supers, turned upside down. They were speedily filled, and we could ensure honey flavoured with the different blossoms, by placing the glass during the season of the orange-blossom, or heliotrope, &c., &c.

Our chief guide in the management was a book written by the Rev. Mr. Cotton, called "My Bee-Book;" and it may be interesting to mention, that when in after years that gentleman accompanied the Bishop of New Zealand to that country, *viâ* Australia, he was my father's guest.

Mr. Cotton's delight at finding his favourites so appreciated was only equalled by our pleasure in meeting the author of "My Bee-Book;" but, sad to say, *our* bees conceived a dislike to their visitor; and upon his exhibiting his fearlessness in handling bees, he was stung (much to the amusement of some *small* bystanders) by two wicked bees. A relation of my own kept her bees in the verandah of her drawing-room; and she has frequently cut out of the hive a large piece of comb, taking care not to break it, and merely cutting through the little connecting links of wax which support the layers of comb; and this she could do with impunity from the super of a busy hive, simply because she lived amongst her bees. Hoping that this letter may not have wearied you,

I remain yours faithfully,

AN AUSTRALIAN.

London, 12th August, 1864.

P.S. I have never had an opportunity of keeping bees in England. I shall look for your promised manual, as I hope some day I may be able to have some of my favourites to care for. I may add, my father procured our original stock from Tasmania, in the common straw hive, a bit of pierced tin fastened over the entrance.

One system I do not see alluded to, which we found answer very well, when we wished, for any cause, to take the old comb and start the bees afresh. We used in the early dawn to place the full hive over an empty one, covering all with a large cloth, and then beat the top hive steadily, not roughly, with a stick. Very soon the queen would take refuge in the lower box, when a board was slipped between, and the upper old hive removed. The bees (the few that loitered behind the queen) soon left the honey to join their friends: at night the new hive was carried to the site of the old one, and turned up upon its own board. We always had cross bars of wood on the hives, upon which the swarm at first clung.

Taylor's and Wood's "Manuals of Bee-keeping" are exceedingly good. Richardson's is very full. Lardner's Treatise in the "Museum of Science and Art" well deserves the attention of the reader.

I do not profess to have struck out any original methods of constructing hives or treating bees. To the science of apiculture I have contributed nothing. All I profess to do is to give plain, practical direc-

tions for the successful management of bees, chiefly from observation and experience.

I am persuaded there has been much useful and instructive matter in my letters, because I have received a few very ill-natured communications. One of them (not the worst) I insert, as a specimen of the reception my little work is doomed to expect. But perhaps the writers may repent of their intentions, and recover the sweet temper they seem to have lost.

August 15.

SIR,—I have read very attentively the letters in *The Times* about bees, and am convinced that the American gentleman is *right*, and that much of what *you* say is mere old woman's twaddle. Your nonsensical rant about loyalty to the queen-bee (in *these* days, when loyalty to *kings* and *queens* is utterly and very properly extinct), and your raving against radical reform (so much wanted in *all* matters), both give evidence of anility and failing intellect.

I shall act on my conviction by ordering the *American* book on bees for myself and friends, and I shall use all my literary influence (which is *considerable*) in preventing

the circulation of *your* poor trumpery twopenny-half-penny bee-papers.

A NON-BELIEVER IN THE "BEE-MASTER" OF TUNBRIDGE WELLS.

P.S. I am no American, but I sympathise with Messrs. Bright and Cobden. I rejoice at the downfall of the Danish monarchy; and I would not fight, *under any circumstances*, either for king, queen, princes, or peoples—not foreign peoples at least. I look on *loyalty* as rank humbug. Kings must behave better before we can respect or love them!

In this work I have purposely left out all notice of a variety of hives as ingenious as they are disliked by bees. Some apiarians have expended all their talent in making tortuous entrances, worrying homes, and elegant residences for the queen and her subjects. They seem to estimate their success by the extent of their departure from simplicity. They merge the useful and convenient in the elegant and complex.. But the less the bees are plagued by intricate and arduous arrangements in

the interior of their residences, the more comfortable and contented they feel, and the more efficiently they work. It is on this account I have written so favourably of the Ayrshire hive. It is simple in structure, and the parallel openings in the roof of the stock hive introductory to the super are far more liked by the bees than a round central hole, while the facility of removing a super in the honey harvest is perfectly charming. The comb in the super is never or rarely connected with the comb in the stock hive, and, therefore, needs no cutting with zinc plates, A screw-driver gently introduced loosens the propolis, or a table-knife may be employed to cut it all round the lower edge of the super, and the proprietor has only to lift it off and carry it away on a deal board.

I can easily see that had I praised several ingenious contrivances for the residence of bees, I should have provoked fewer charges of ignorance of modern apiculture. I repeat, I have read much on the subject; but my recommendations are not

the results of theory or imagination, but of practical knowledge and of careful watching.

The best hop-garden is that which grows the most and best hops; the best mill is that which grinds most corn; and the best hives are those in which is deposited the largest amount of the best honey.

By all means let us have observatory hives for scientific investigations; but what the cottager requires is plenty of produce, with the least tax on his toil and pocket. Hence this work is drawn up, not for scientific apiarians, but for all who wish to enjoy a pleasant and profitable employment.

I must tender my best thanks to Messrs. Neighbour, of Regent-street, London, and to Mr. Pettitt, of Snargate, Dover, for their permission to copy such of their woodcuts as I thought it useful to describe or to suggest amendments on.

I may also add, that in using the name, "*The Times* Bee-master," I avail myself merely of the title given me by the countless correspondents who

did me the honour to write me either directly or indirectly through the editor of *The Times*.

In reprinting my letters to *The Times*, I must here notice an alteration I think expedient. I felt it right to reply to a very injudicious and extreme letter which appeared in that paper. I did so playfully, and with kindly feeling. But the correspondent I thus replied to seems to have viewed it as a personal attack. Under the inspiration of very irritated feelings he wrote another letter to the Editor of *The Times*, which was very properly refused admission. But he was kind enough to send it to several papers, in which he published it, prefacing it in one with controversial remarks so far removed from the courtesies of fair correspondence, that it ceased to be possible to hold any further argument with him. I am really very sorry that a gentleman I never saw, and do not yet know whether he is a clergyman or layman, should have so passionately interpreted remarks made by me in perfect good-humour. I offer him every apology that is due for being

misunderstood. In order to avoid any such contingency again, I have omitted his name, and have substituted "Your Correspondent."

I may also add, that when I sent my letters to *The Times* I had not the remotest idea of composing a book on the subject. Having other and absorbing work to attend to, I have been able to devote spare hours only to á very pleasant work, undertaken at the request of many, and dedicated to the service of all.

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Erratum.—Page 45, line 18—*For* "inches" *read* "degrees."

BEE-KEEPING.

BY

"THE TIMES" BEE-MASTER.

THIS work is not a speculative or philosophical treatise on bees. Its main interest consists in its usefulness; and its author's greatest reward will be the greatest measure of his success in promoting among cottagers and others a means of paying their rent, at once interesting, civilising, and remunerative. Next to this, I hope I may contribute toward the extinction of the savage and unprofitable, but almost universal, habit in this country of burning the bees

with sulphur in August, in order to collect honey richly flavoured, and much deteriorated by sulphurous acid. It is a fundamental principle in my bee management, that no bee shall be burned, or, if possible to avoid it, crushed or killed. No man deserves the name of a Bee-master, or should attempt to keep bees, who has not resolved, with all his might, to avoid bee-murder. Bee-cide, like homicide, may accidentally occur, but it must be accidental, not designed and culpable. That system of management which combines the safety and health of the bees, with the production of the largest amount of pure honey available to the proprietor, while providing generously for the inmates of the hive during the winter months, deserves the greatest patronage.

I.—BEE-KEEPING MONEY-MAKING.

WE live in a practical age. Proposals of all sorts are too often, right or wrong, weighed against gold:—"How much will it bring? Can I turn a penny by this business?" I do not pretend to say bee-masters are rich men, or that the way to a fortune is through a bee-hive; but I do assert that a poor parish minister, vicar, or curate with a little glebe—a cottager who works all day for the squire—or maiden ladies who desire to engage in very delightful and loving labour—may add to their little income or stipend or dividend from ten to twenty pounds a year. To half-pay officers I would earnestly recommend bee-keeping. It would keep them out of those wild

speculations into which, from their inexperience in business matters, they are so frequently and ruinously drawn, by giving them an interest, which would soon become a passion, in studying and conferring with a new family, besides yielding them a few spare sovereigns for personal use or charity. For white cells filled with honey in glasses—than which nothing more elegant or picturesque can be placed on a breakfast-table — one can obtain in June two shillings, and even two shillings and sixpence, a pound. For honey later in the season one and sixpence a pound may be easily had; and where the proprietor prefers to be his own consumer, he may dispense with bacon and butter, and take what is far more wholesome—honey—at breakfast. It is a fair average to calculate on fifteen pounds of surplus produce from each hive, if properly attended to. I do not see why our country should not be a "land flowing with milk and honey," or why we should import so much honey and wax from abroad, exporting good money in return, when so many flowers lift their beautiful

blossoms, waiting and longing to be kissed and rifled by visitors they love so well. It should not be forgotten, too, that bees do immense good to flowers; some think they introduce one to another, and celebrate the marriage of the flowers. This, however, is certain: flower-gardens are immensely benefited by bees, and therefore every lover of flowers and proprietor of gardens should never drive away or destroy a bee; for the visitor is not only collecting honey for his bee-master, but adding to the variety, fragrance, and beauty of the flowers of their owner.

II.—BEE-KEEPING A SOURCE OF ENJOYMENT.

WHEN pleasure and profit can be combined, time runs swiftly and the heart feels happy.

It is enjoyment to stand by one's bee-hives and watch the intense and untiring work of one's bees. It is like standing at a window in Cheapside, and watching the counter-currents of human beings that ceaselessly traverse its pavement; only, instead of faces grooved with cares and pale with anxieties, we do not see issuing from their hives or returning home a single bee that seems bowed down with trouble or fretful about the future. Each bee, from the queen down to the sentinel at

the gate, seems to have heard the Master's words,—"Take no thought" (*i.e.*, irritating care) "for the morrow, for the morrow shall take thought for the things of itself. Sufficient unto the day is the evil thereof."

Bees rarely fail to become acquainted with a kind and affectionate master. I have stood in the midst of thousands returning home after their day's work, and seen them resting on me, brushing their wings and bodies, and, thereby refreshed and recruited, they enter their home and deposit their sweet burdens. They do not forget little acts of kindness shown them, and rarely fail to show gratitude,—an example Christians would do well to copy. I have sat for hours by my hives with glass windows, and watched the orderly and beautiful array in which some give wax, others build it into forms of strength and beauty, others clear away incidental dirt, others pour honey into the warehouses, others carry out their dead, and all reverently and loyally attend to the instructions of their queen. Relays of ventilators, joining the tips

of their wings and making fanners, take up their position at the doors, and send in currents of fresh air. Others are placed as sentries on the bee-board, who, like faithful soldiers, repel wasps and moths, and die rather than desert the post of duty. There is not an idle bee in a hive, if one may except the drones after their mission is ended. *Fruges consumere nati*, they meet with the consequences which all idle and unproductive citizens provoke. They, however, may be regarded as the exceptional inmates. The bees do not fail to understand their relations, and therefore they get rid of them as soon as they cease to contribute to the wealth or comfort or protection of the hive. They become in June and July the mere hangers-on—the fat, lazy monks, who believe that everybody is made to work for them, while they are excused helping anybody. But the bountiful Creator has left no place for indolence in this world of ours; it would be too disastrous an example to be permitted with impunity. The bees accordingly turn them out to starve, or garotte them as they catch them, and

at all risk get rid of the incumbrance. Do idle young men deserve better treatment?

A hive in June is a perfect study, a model of order, work, neatness, and beauty; it is rich in interest to everyone who has an hour to spare. About nine o'clock at night you cannot do better than listen for a quarter of an hour by your hives, and you will hear an oratorio sweeter and richer than you ever heard in Exeter Hall. Treble, tenor, and bass are blended in richest harmony; sometimes it sounds as the distant hum of a great city, and at other times as if the apiarian choristers were attempting the halleluiahs which will swell from earth to heaven when all things are put right, and bee and bird and every living thing sing joyously together the jubilant anthem peal, "Great and marvellous are thy works, Lord God Almighty. Just and true are thy ways, thou King of nations."

III.—HOW TO BEGIN BEE-KEEPING.

YOUR garden may be very small, and its flowers few and far between; but as your bee-pasture is an area two or three miles round on all sides yours for the use of your bees, though entered in other peoples' title-deeds, your own little plot need not much trouble you. Bees seem to prefer to feed at a little distance from the hive, but have no objection to pasture close at hand. In the beginning of August, when the honey-yielding flowers begin to fail, I have found Broadwater Common, near Tunbridge Wells, which grows the finest heather south of Braemar, covered with my bees, and have

lain down amid the heath-blossoms, watching and listening to my young friends, immensely enjoying their work.

But if you have any spare space—and there are always nooks and spots available in the smallest garden—sow on these lemon thyme in abundance, rosemary, lavender, salvia, borage, mignonette, and crocus. Apple-trees, gooseberry and currant-trees, and above all, raspberry-plants, are great favourites with bees; and as their blossoms come early in spring, they are most seasonable and productive. But your chief reliance must be on neighbouring acres of bean-fields and buckwheat or clover meadows, heather and furze, and hedge-blossoms. Lime-trees are very valuable; I wish people would allow thorn-hedges to blossom. Let me urge the cottager to use for the edging of his garden lemon-thyme instead of box or daisies. Do not fear keeping a dozen stocks. I think many apiarians talk nonsense when they allege that a district may be overstocked with bee-hives. If the surrounding country be wholly

arable, with little common, and with too good farming, it may be overstocked. But there are still left commons unenclosed, woods and heath, and clover and tiny weeds, which farmers persecute and bee-masters love; and far off are gardens of all sorts and sizes, in which flowers are cultivated for the owners' pleasure, constituting admirable bee-pasture. I only regret there is such a wide-spread rage for double flowers, for bees never touch them. On that magnificent standard rose, so rich in delicious perfume and so very lovely, a bee never alights; but the briar and hedge-rose are favourites and much frequented. On the Clyde, it is usual for bee-proprietors to carry their hives to Arran, Dunoon, and Kilmun, as soon as the heather comes into blossom; and cottagers take charge of them at a shilling apiece. The hives often therefrom receive great and remunerative additions.

Dr. Bevan states:—

"In Lower Egypt, where the flower-harvest is not so

early by several weeks as in the upper districts of that country, this practice of transportation is carried on to a considerable extent. About the end of October the hives, after being collected together from the different villages, and conveyed up the Nile, marked and numbered by the individuals to whom they belong, are heaped pyramidally upon the boats prepared to receive them, which, floating gradually down the river, and stopping at certain stages of their passage, remain there a longer or a shorter time, according to the produce which is afforded by the surrounding country. After travelling three months in this manner, the bees, having culled the perfumes of the orange flowers of the Said, the essence of roses of the Faiocum, the treasures of the Arabian jessamine, and a variety of flowers, are brought back about the beginning of February to the places from which they have been carried. The productiveness of the flowers at each respective stage is ascertained by the gradual descent of the boats in the water, and which is probably noted by a scale of measurement. This industry procures for the Egyptians delicious honey and abundance of bees'-wax. The proprietors, in return, pay the boatmen a recompense proportioned to the number of hives which have thus been carried about from one extremity of Egypt to the other."

Richardson sensibly remarks :—

"Water carriage, when procurable, is the best, as it shakes the hives least, but when land carriage must be resorted to, the hives should be carried on poles slung on men's shoulders. The journey should be pursued at night only, and the bees suffered to go forth and feed during the day. Such is their instinct, that they will readily find their way back; but they should not be suffered to go forth until at the distance of upwards of ten or eleven miles from their original home, otherwise they will be lost in endeavouring to regain it—a moderate distance induces them to abandon the idea, and to become reconciled to their new quarters. If travelling by canal, the hives should be removed from the boat, and placed on stands at some distance from the bank, ere the insects are let out, otherwise they will be lost in thousands by falling into the water on their return. The charge made by shepherds for taking care of the hives during a season is from one shilling to eighteenpence each. It is better to pay a trifle over and above the usual fee, in order to prevent your hives being placed too near to each other, or to those of other parties; for if your weak stocks happen to be placed near the strong ones of some one else, you will stand a fair chance of having them all killed in encounters with their more

powerful neighbours. .It would be well also to see that your hives are placed in a situation where they will be safe from the attacks of cattle or other foes. Before fetching the hives home again from the heath, it will not be amiss to ascertain their condition and weight, and to take from them what honey they can spare. I must here inform you how to ascertain the state or wealth of a hive."

On the subject of removing bees to the heather in August, Mr. Briggs makes the following useful and practical remarks:—

"In the vicinity of extensive heaths, the bees are removed to them about the beginning or middle of August, according to the season. The usual practice is to raise each hive with small wedges in the evening, to induce the bees to congregate together at the top of the hive. The hives are then firmly fixed to the bottom boards, or tied up in cloths, and conveyed in the night, or very early in the morning, to the garden of a shepherd or other person whose residence adjoins the heath. All hives and swarms are taken, including old and young ones, and the persons who receive them usually charge a shilling for each hive during the season. The hives are

thus very frequently crammed together as close as they can stand, and the consequences are that much fighting and loss of life is often caused, and the weak stocks of one person are frequently partly destroyed and robbed of their stores and killed by the stronger ones belonging to other persons. When the blooming of the heath is over, the old stocks are, in general, suffocated on the spot, to obtain possession of the fruits of their labours, and those intended for winter stocks are conveyed home by their respective owners.

"The above system of managing bees at the heather is susceptible of material alterations and improvements. I would suggest that it would be of great advantage to the owners of bees residing within twenty miles' distance, if the proprietors or occupiers of residences adjoining the heath were to extend the accommodation by enclosing a larger extent of ground which is suitable for the purposes desired. It might be cheaply and expeditiously performed by hiring a few dozen of stout stakes, &c., from the neighbouring farmers for the season, and having the bars of them full of coarse thorns, briars, furze, or other convenient or suitable materials, to prevent the inroads of cattle and other depredators.

'"I would recommend that none but strong stocks

be taken to the heath, until arrangements are made for their convenience and accommodation; and that the collateral system of side hives, &c., be practised with them whilst they are at the heath, as well as on other occasions."

Where there is no water conveyance, a hive may be suspended from each end of a long pole, which may be carried on the shoulder to the neighbourhood of a common, in August, not less than four miles from your garden, and put in charge of a reliable cottager.

"In Yorkshire," says the Rev. Mr. Cotton, that prince of bee-masters, "it is the regular custom of the country to send the stocks to the moors for change of pasture in August and September. Cotters, who have a little garden by the moorside, take in dozens every year, and get a shilling a stock for their trouble. The trouble is a mere nothing—at least not one shilling's worth in all—and the pleasure is surely very great; for what can be a greater pleasure than to have ten additional stocks of bees on a visit to your own, and to cheer you with their glad music whenever you are walking in your garden? To say nothing of the pleasure you must feel at their

honied stores, by playing the part of a kind host to these busy bees; and then, what is more, you may have the still greater pleasure of showing your friend (for all bee-masters are, or ought to be, friendly) how to take up his bees who have been your guests so long, as I trust you do your own, that is, WITHOUT KILLING THEM. You and he may do so, if you try; and I, a bee-master like yourself, beg you most earnestly to try. What I have found a very good way with my bees you cannot find a very bad one. The stocks are taken up in the old way as soon as the heather goes out of flower. I hope many a man will learn by my letter to take them up by the fingers, instead of the sulphur match, that ready instrument of bee-murder. In France they put their hives into a boat, some hundreds together, which floats down the stream by night, and stops by day. The bees go out in the morning, return in the evening, and when they are all back and quiet, on the boat floats. I have heard they come home to the ringing of a bell; but I believe they would come home just the same whether the bell rings or no. I should like to see this tried on the Thames, for no river has more bee food near its banks: willows, the best bee food in spring; meadows, clover, beans, and lime-trees, in different places and times, for summer. A handy man, who could make his own boxes,

though not up to hard work, might, I am pretty sure, gather *through the mouths of his many thousand bees enough to fill his own one mouth*, though it be somewhat larger. He might float softly *down* the river, as the flowers go off at one place and come on at another; and any bargeman would be glad, for the small price of one pound of Thames honey, to give him a tow *up* when he wishes to go back. I SHOULD LIKE TO SEE IT TRIED."

But all this is supererogatory at present, and temporary removals are undesirable, unless where surrounding pastures entirely fail in August. It is, at best, supplemental.

Taylor, in his useful *Bee Manual*, says:—

"It is almost needless to say, that in the nature and extent of the vegetable production following in succession in the immediate neighbourhood of an apiary, must mainly depend its prosperity. After every care has been bestowed on all points of housing and management, it is in vain to expect a large harvest of honey where Nature has limited the sources of supply, or restricted them to a particular season of the year."

Payne observes:—

"I have always found the advantage of planting in the

vicinity of my hives a large quantity of the common kinds of crocus, single blue hepatica, helleborus niger, and tussilago petasites, all of which flower early, and are rich in honey and farina. Salvia memorosa (of Sir James Smith), which flowers very early in June, and lasts all the summer, is in an extraordinary manner sought after by the bees, and, when room is not an object, twenty or thirty square yards of it may be grown with advantage. Origanum humile, and origanum rubescens (of Haworth), and mignonette may also be grown. Cúscuta sinensis is a great favourite with them ; and the pretty little plant anacampseros populifolium, when in flower, is literally covered by them. Garden cultivation beyond this, exclusively for bees, I believe, answers very little purpose."

IV.—THE BEE-HOUSE, AND HOW TO PLACE IT.

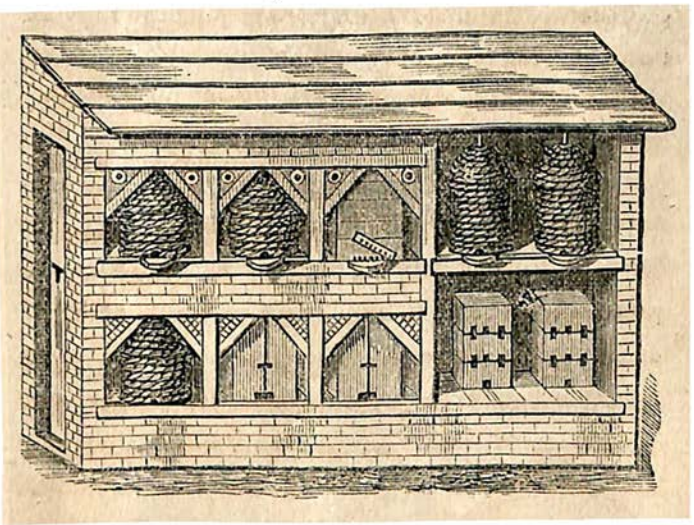
HAVING decided on the furniture of the garden and the flowers it should grow, and the best kind of neighbourhood for pasture, we must now discuss (and it is done from very considerable experience) the structure and aspect of the bee-house under shelter of which your hives are to stand. Taylor remarks:—

"The common wooden bee-houses, as usually constructed, open in front, and closed altogether behind, retaining the sun's heat as an oven, are objectionable. These are frequently the receptacles of dirt and vermin, and most inconvenient to operate in. It would be an improvement to make them deeper backwards; or with a falling front, moving on hinges, so that the hives can be recessed behind it, away from the influence of

weather. At the back should be folding doors, opening from top to bottom, allowing a good access to the hives. For greater convenience, it is best to have them only in a single row, with good head room. But a still more desirable plan is to board up the front of the house entirely, making oblong openings through for a passage to the bees, with an exterior alighting board, a good deal slanted downwards (the bees preferring this to a flat surface). The hives are arranged immediately behind, upon a shelf, the further apart the better, as the bees occasionally mistake their own homes, and fall a sacrifice in consequence."

The following is a sketch of the shed proposed by Dr. Bevan. It is extremely picturesque. My only objection to it is his use of thatch, which shelters vermin—the pests it is hard to keep away in the most favourable circumstances. Dr. Bevan's shed or bee-house is seven feet square in the clear, with three hives on the upper shelves and three on the under.

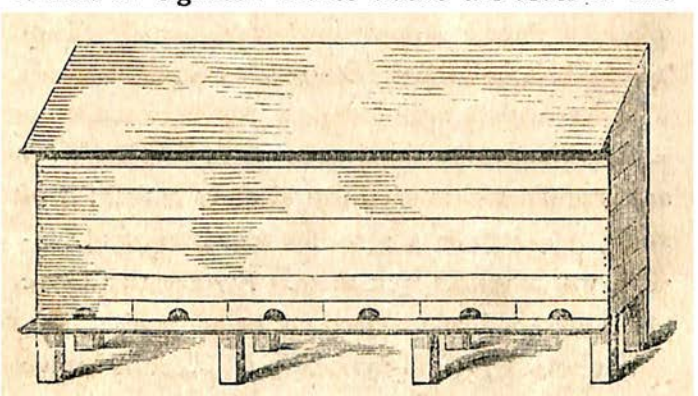
A very picturesque and efficient bee-shed is presented by Dr. Lardner, about twelve feet long and about nine feet high.

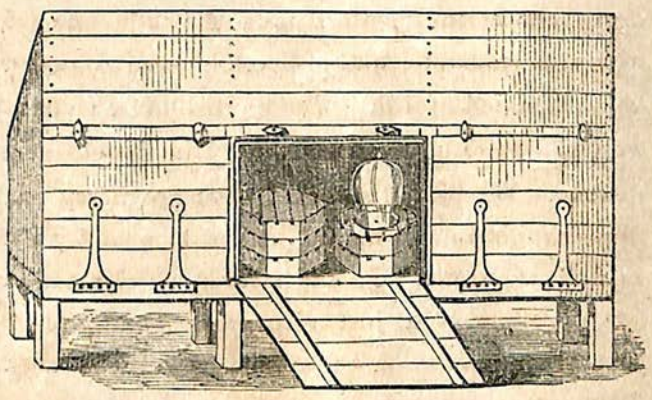


My objection to this bee-house is, that the hives are exposed too much to wind and weather; if of straw, they will soon rot—if of wood, wet and sunshine will rend and split them. Besides, tier above tier is not good, and it need not be adopted.

The shed I prefer is as follows:—Let it be twelve

feet six inches in length, six feet in height, and two feet six inches in depth. Let it be made of good, strong, smooth deal. Divide it into six equal compartments, divided off from each other. Let the roof be also of smooth deal, covered first with Croggon's patent felt; and laid over the felt, and nailed down, let there be zinc plates, projecting six or eight inches in front. Let an opening three inches wide extend along the front from end to end, with a continuous landing-board projecting beneath it, and sloping down at an angle of twenty-five degrees. The floor should be about a foot or eighteen inches above the level of the





ground, and perfectly smooth. Behind let there be three doors, with hinges attached to the floor, falling back when open, and thereby forming a pleasant platform, when laid down and resting on the ground, for the bee-master to watch and study, and deprive, and otherwise fulfil his mission. When closed, there must be a good padlock, as bee-hive lifters are still too common in every part of the country. In very hot weather, open the doors behind, but only in very hot weather. I have found from experience that the smoother the surfaces of the bee-shed inside, the less they are liable to the operations of the

spider, one of the greatest pests of bee-houses. I have unfortunately, and too often, seen a dozen bees entangled of a fine May morning in a spider's web, and most of them excavated in the cleanest manner. Wasps and spiders I have no mercy on; they are thieves and murderers and beasts of prey, as well as vermin. To the former, extermination by brimstone is a just recompense, and to the latter the application of a hard dry brush is a daily duty.

I prefer three of these bee-sheds, located in different parts of my garden, to one very large shed with under and upper tiers of hives: this makes less likelihood of confusion in swarming. I do not like the sheds to be placed under large trees, the drippings of which tend to create damp. Shrubs, raspberry-plants, and even gooseberry-bushes, not nearer than ten or twelve feet, form nice resting-places to the heavy-laden bees. Under and immediately around the hive should be closely-mowed grass. The front of the hive is best due south, and, if convenient, with an inclination to the east. From

the east and west a rising ground, or shrubs tolerably high, are a desirable protection; they break the force of the gales. Do not place your bee-shed at a great distance from the house: bees are civilised and domestic, and delight to see children at play while they are at their work; kept out of society, they grow savage. Having selected the position, do not change it, unless imperatively and unavoidably necessary. Gelieu justly observes:—

"I have seen people shift about their hives very inconsiderately; but change of place invariably weakens them, as the bees will return to their old residence, the environs of which are so familiar to them. A hive should remain as fixed to the spot as the ancient oaks, in the hollows of which they delight to establish themselves; where they have their young, their companions, their beloved queen, and all their treasures. When the young bees take wing for the first time, they do it with great precaution, turning round and round, and fluttering about the entrance, to examine the hive well before taking flight. They do the same in returning, so that they may be easily distinguished, conducting themselves

nearly after the same manner as the workers of a newly-hived swarm. When they have made a few excursions, they set off without examining the locality; and returning in full flight, will know their own hive in the midst of a hundred others. But if you change its place you perplex them, much the same as you would be if, during a short absence, some one lifted your house and placed it a mile off. The poor bees return loaded, and, seeking in vain for their habitation, either fall down and perish with fatigue, or throw themselves into the neighbouring hives, where they are speedily put to death. When hives are transported to a considerable distance, there is no fear that the bees will return. But this inconvenience would be sure to take place if they were removed only a few hundred paces from the spot they have been accustomed to. The hive may not perish, but it will be greatly weakened. In my opinion, if the situation is to be changed at all, they should be taken at least a mile and a half."

Richardson, who has offered many sensible suggestions on bee-culture, makes some very sensible remarks on this. But I do not agree with him in one of his opinions—that a south-westerly aspect

is best, or that a south-eastern aspect is likely to be prejudicial, from its tempting the bees to go out in too cold spring mornings. The early sun in early spring is not excessively seductive. Besides, bees are very good judges of temperature, as they are infallible prophets of weather, and may be safely left in this matter to the exercise of their own good sense. It is also worthy of notice, that the main work of bees is over by four o'clock in the afternoon, and the setting sun is therefore less important. They are early risers, and go early to bed. But his remaining observations on bee-sheds are thoroughly good :—

"Some recommend high trees for the purpose of keeping the air calm, lest the bees should be blown down when returning home. High trees are not advisable; they form an evil themselves of greater magnitude than that which they may be designed to remove. Bees are seldom blown to the ground by mere wind; but even when they are, they can, in a great majority of cases, recover themselves. Whereas, if blown amongst trees, they will be sure to be whipped so violently by the branches, that they are absolutely hurled to the ground

with such force as to render their recovery hopeless. The bees also fly low on their return, when they arrive at the immediate neighbourhood of their stand, and, consequently, high trees would be not only useless, but absolutely inconvenient. Whatever trees you wish, therefore, to plant in the immediate vicinity of the hive should be of low size, planted at the sides of the hive, so as to leave the entrance quite free. Wildman recommends them, and, I think, very judiciously, to be 'of the dwarf kind, with bushy heads, in order that the swarms which settle on them may be more easily hived.' Now, although by judicious management swarming will generally be prevented from taking place, yet, despite of our utmost care, it may accidentally occur; or the bees may quit their boxes in a body, from various causes—some of which I shall endeavour hereafter to explain—and, under such circumstances, Mr. Wildman's suggestions will be found valuable. The garden, therefore, in which you fix your stands should be thus planted; and I further, for the same reasons, recommend wall fruit trees and espaliers.

"Avoid a site near mills or other noisy places, or the neighbourhood of bad smells, as factories and the like; and if, as occasionally may happen, your stand be placed against your garden wall, behind which is the farm-yard,

let not a dunghill be built against the opposite side. I have witnessed this before now, and in one instance found the consequence to be a desertion of the boxes. Do not place your stand where you see rat or mouse holes, and let your shed be all of wood, never thatched with straw, as that substance harbours mice, moths, and other similar enemies to your stock.

"Water is essential to the well-being of your bees; it must, however, be presented to them judiciously, or it will prove a greater evil than a good. If you can coax a shallow rippling brook through your garden, so much the better; if not, place near the stand small, shallow, earthen pans of water, and put some pebbles in them. This water must be changed daily. It is highly objectionable to have a pond or canal in your neighbourhood: you will lose thousands of your bees through their means every season, as they will be constantly blown into them when returning heavily laden to the hive, especially in the evening, when wearied after the toil of an industriously spent day. The pebbles in the troughs are for the bees to rest on while drinking, and are the recommendation of Columella. I have seen tin plates perforated with holes, and placed over the pans just on the surface of the water, used for drinking-vessels for bees; I, however, prefer the pebbles."

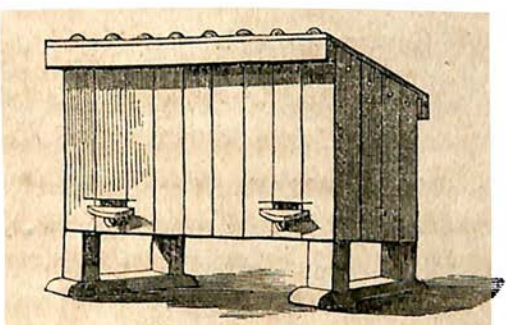
I have found it a very good plan to place two or three soup-plates filled with pure water mixed largely with round pebbles in front of the bee-house; they thus find water to drink and stepping-stones for their tiny feet, which keep their wings out of water. In long-continued dry and hot summers, I have also been in the habit of using a common garden-squirt, with the end perforated by a dozen pin-holes. The water thus showered on the bee-house at noon cools it, and does not strike down the bees, and seems most acceptable to them all.

The shed should be kept scrupulously clean and dry. Earwigs, snails, and spiders will all try hard to establish their quarters under the warmth of the hives, and must be repelled. Nothing but the bee-master's frequent but quiet and undemonstrative use of a good hard painter's brush, perfectly dry, will keep these pests at a distance. I am no advocate of killing a single living thing, but if these unproductive creatures will prey on the most productive of insects, and kill and steal,

there is no help for it. The bee-master must keep his bee-sheds particularly clean; and as spiders and earwigs love dust and dirt, and are inseparable from it, they must go with it. At all events, I cannot give them hospitality in my bee-house.

For people to whom expense is no object, the bee-houses of Messrs. Neighbour are perfect—as ornamental as they are efficient.

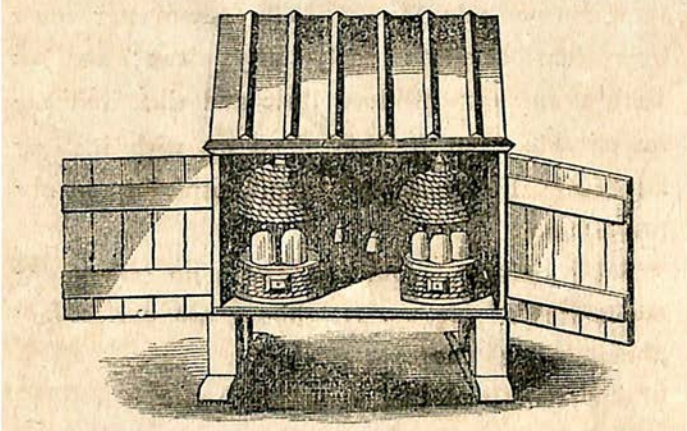
Their two-hive shed is as follows:—



Bee-house to contain two hives.

Front view of bee-house, price £3 10s., *well painted*, constructed to contain two hives. 3 ft. 6 in. high, 4 ft. wide.

The back view is given on the following page.



Back view of the preceding, showing the interior. The top hive or cover for the glasses is balanced by a weight, so as to be raised easily for the purpose of inspecting the bees *at work* in the super hives.

I have already said, what I repeat, that I do not think one row of hives above another in the same bee-shed at all expedient.

V.—HIVES AND BEE-BOXES.

THE inveterate use of the common straw hive, with its fire and sulphur application in autumn to its unhappy inmates, is deeply to be deplored. No humane man can look on the straw hive, rotting on a stand, wasted and worn by wind and rain, covered with a brown earthenware basin, under which vermin breed and multiply, and doomed to brimstone and bee-cide, without feeling it is a penal settlement, or cell of doom, for subjects unworthy of it. There is nothing picturesque or pleasant about it, and the

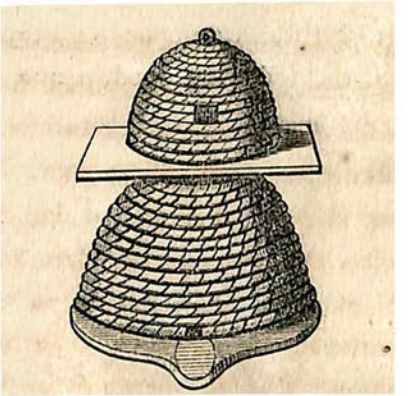
moss of age and usage even of a thousand years fail to beautify it.

A bee-shed is an absolute necessity; it may be rough and coarse, and badly put together, but it cannot and must not be dispensed with. I will assume, in the first instance, that the cheapness of a common straw hive—a rough one costing sixpence, a better a shilling, and a very excellent one eighteenpence—brings it within the reach of a very poor cottager. On this assumption I proceed to show how he can make the best of a bad house. Placed in his shed with a good swarm in May, it is likely in a good year to be full by the end of June. He must then have ready a good thick board—say three-quarters of an inch or an inch in thickness and twelve inches square, with a round hole in the centre about three inches diameter, perfectly smooth and bevelled in the lower edge of the hole. On this he must have ready a small straw hive with a piece of glass, four inches by three, fastened into the side, in order to see inside; but if he can afford it, still better, a bell-glass or

garden-glass, with a woollen nightcap drawn over it, to keep out the light and keep in the warmth. Let this stand ready by him behind the bee-house, about twelve o'clock at noon. He must then take a sharp table-knife, and quietly and fearlessly cut a hole in the top of the hive, about three inches in diameter, and having removed the top by taking hold of its straw loop, he is to place the board with its super over his hive. The smoother he makes the cutting the less trouble will the bees have, and the sooner they will ascend. If the weather still proves friendly, he may have five or six pounds of beautiful honey before the middle of August, and there will be abundance for his bees in the stock hive during winter. The way to remove the super is this:—Get a zinc plate, with sharp edges, some fourteen inches square, press it quietly between the super and the board, laying the left hand on the super and pressing with the right, taking care not to disturb the board on the hive, which the bees will have fastened down. Carry off the super with its bees and honey, laying another board over the

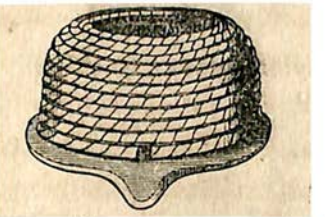
hole. Place your super, with the zinc plate below it, at fifty or a hundred yards' distance from your bee-shed; edge up the super about two inches from the plate after it has stood still an hour. The bees will fly out in succession and make their way straight home, and not one will turn on you to sting you. It seems then and there, and in so new circumstances, to dawn on their minds for various reasons, that their proprietor is merely taking his portion in consideration of the care he has bestowed; or, like a mob without a head, they lose all sense of order, self-possession, and organisation, but, unlike a Belfast mob, they rush home out of harm's way.

The Common Straw Hive.



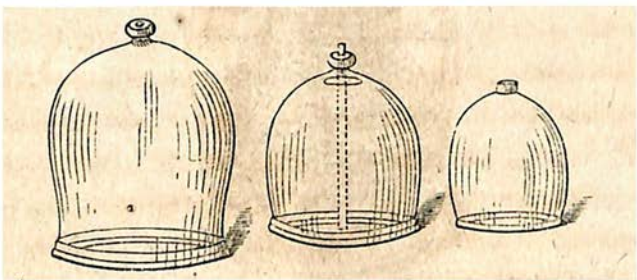
The same hive, with central hole and perforated board, and small straw super or cap.

A small straw super, with glass window, to be placed on the common straw hive.



Common straw hive, with top cut off for board and bell-glass.

From Mr. Pettitt's catalogue—a very sensible one—I take the following models and prices of bell-glasses for supers.



Bell-shaped Glasses, for working on the top of any of the hives. Price, 10 in. 4s.; 7 in. 2s. 6d., 6 in. 1s. 6d.; 4 in. 1s.

Neighbour's are still better.

I prefer Taylor's glasses to either.

A bell-glass nearly filled with honey.

But supposing you can afford to buy a straw hive with a hole already worked at the top—and it will not cost above a shilling more—you are to place the board with a corresponding hole on the top of this, and, till the middle of June, a small board over, or bung in the hole of the board. Then take it out as before, and place over it your bell-glass or small straw hive, and act thenceforth as already described.

If, however, you can invest a little in apiculture, as people do in agriculture or market-

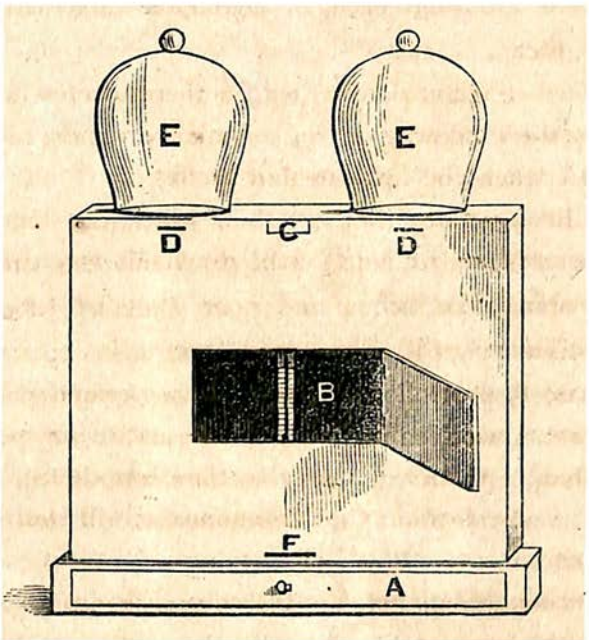
gardening, only on a very much smaller scale, I strongly recommend wooden hives or boxes. These, well made, are necessarily expensive. The objections commonly urged by those I have talked with are, first, that they split and twist, and get out of gear. This may occur in the best in a slight degree, but it arises generally from having unseasoned wood and bad workmanship. Green wood is utterly worthless. Bad workmanship is dearest, when done at the very lowest rate. The best workmanship and the most seasoned wood, I have invariably found in the workshop of Mr. Pettitt, Dover. They never cast, and are beautifully smooth, and all the fittings play easily. Such wood and workmanship, no doubt, may be had of any sensible and honest carpenter. My reference to Pettitt is merely the record of my own experience. In every case the entrance should be cut, not out of the hive, but out of the board on which it rests.

The second objection is, that wood is not sufficiently equable in temperature. I answer, if pro-

tected by a bee-shed, which I regard as an essential part of bee-furniture, this objection, so far as summer is concerned, is at once disposed of. Neither rain nor the direct rays of the sun can affect it. But in winter, I am persuaded from thorough experience, that in all hives under sheds additional shelter is required to keep out the searching north and east winds, and to keep in the vital warmth of the bees. For this purpose, I regard good brown paper, or a newspaper after you have read it, as the cleanest, neatest, and really warmest protection. Vermin gather less about paper than woollen material, and brown paper is less palatable to insect pests than any other. Let the back and ends of your bee-boxes inside the bee-shed be covered over in October—the front being left uncovered, unless by the bee-shed, and you will find every objection to wooden hives disposed of by facts.

The first illustration I will present is that of one by Pettitt, made of the best seasoned deal, unpainted, of course; for paint, however necessary

to the shed, must on no account be suffered to pollute the hives.



On the top of this hive, of which I give a back view, are four apertures, each about three inches by two; zinc dividers, D D, being pushed in before, receiving a swarm, shut off all egress,

and on being withdrawn in May, allow the bees to ascend into the bell-glasses E E, of which there are four, each, of course, covered with its nightcap.

B is a glass window, with a thermometer inside. By the window you can examine progress, taking care when you leave to shut the lid.

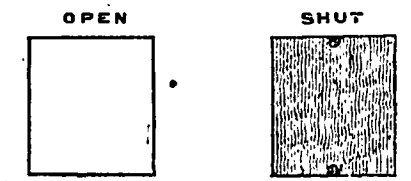
In very dry, hot weather, when the thermometer rises to ninety-five, draw out the drawer A about two inches, and open the little door C, withdrawing at the same time also the zinc plate F, pushing in in its place a perforated zinc plate, precisely the same in size as F, but perforated. A current of air is thus introduced, and in a short time the thermometer will fall five inches.

Though I do not like the square shape as much as the octagonal or hexagonal, yet I regard this as a very valuable hive-box.

Instead of bell-glasses, Pettitt has substituted boxes for supers, about ten inches in height and seven inches in breadth; the front having glass

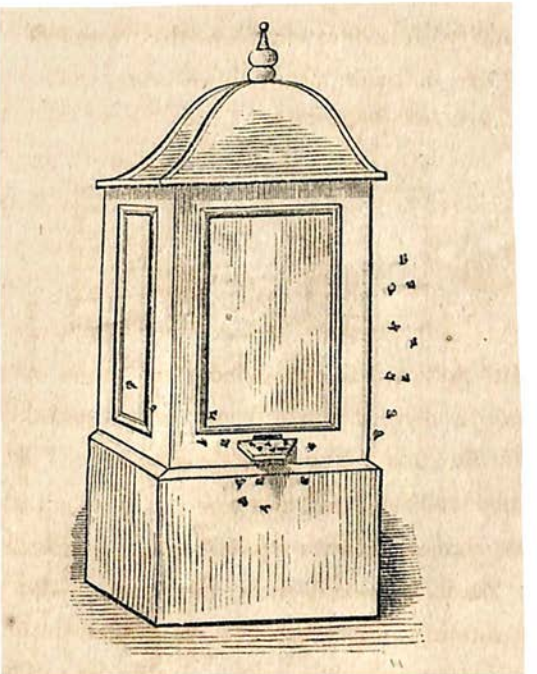
instead of deal board, with a shutter ready to be put on.

It is in this way:—



Mr. Pettitt has provided, for those who can afford it, a very elegant and ornamental house, which he calls "The Temple Bee-hive." It forms a very suitable ornament on a lawn, and when three guineas can be spared, nothing can be better. It is, however, more adapted to the garden surrounding a gentleman's residence than to circumstances in which it is desirable to obtain large profits from little outlay. But as I wish proprietors of estates to take an interest in bee-keeping, I would try to tempt them by specimens of ornamental bee-furniture.

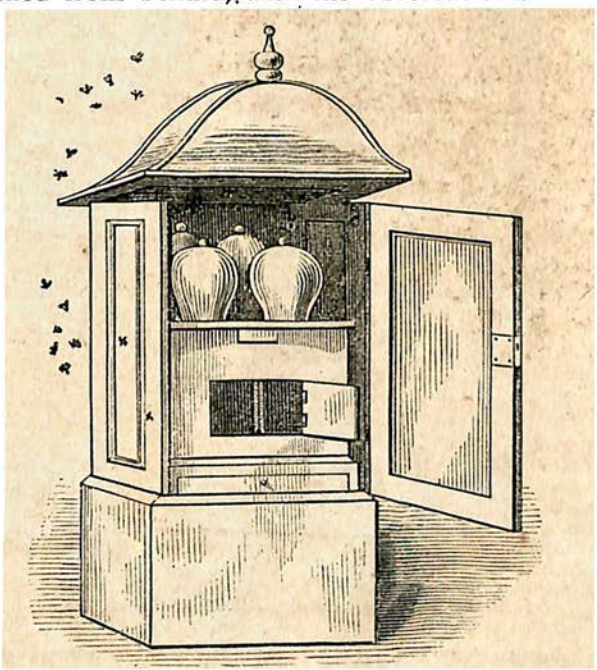
I give the drawing of it shut, with Mr. Pettitt's description.



Temple Bee-hive, closed. (Showing the entrance).

"Temple Bee-hives, for the humane treatment of honey-bees, are got up in a tasteful and substantial manner; and when placed upon a lawn, in a flower-garden, or on a balcony, have a most picturesque appearance. They need no shade or shelter from extreme solar heat in summer, or from humidity and cold during winter, but afford of themselves a sufficient protection to the industrious tenants. Each hive is furnished with four bell-glasses, from which the drones are effectually excluded, and the temperature of the interior can be so regulated by the use of the ventilators and thermometers, as to prevent the necessity of swarming."

I add also a drawing of the same Temple opened from behind, with his observations.



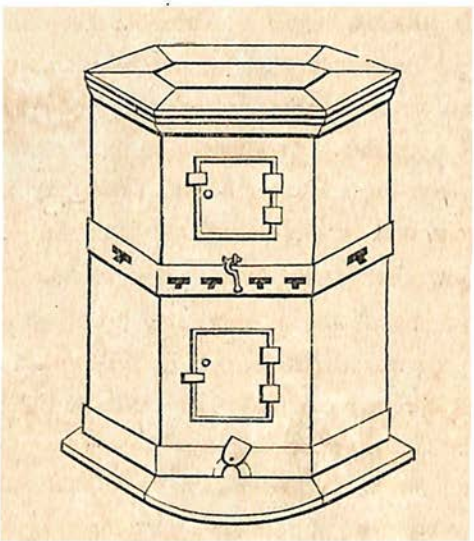
Temple Bee-hive, open. (Showing the interior.)

"This plate shows the interior of the Temple Hive on the preceding page, with four glass supers upon the top. Owing to the difficulty some persons have experienced in getting the bees to work in the glasses, we have introduced small wooden boxes with glass windows; and it is quite certain that the bees will collect a larger quantity of honey in these small supers than they will in the glasses, particularly in uncertain and unsettled seasons."

Pettitt also constructs a wooden hexagonal hive; but he uses the top as a mere cover to the glasses, and of course perforates the top with four holes, on which he places the glasses. If he will adopt my amendments, he will give us a hive in all respects perfect. First, he must use the top half purely as a super for the honey available to the master. Secondly, he must make half-a-dozen parallel slits from front to back, with corresponding removable slides, made by a rabbet-plane, to be withdrawn in May, when it is desirable that the bees should ascend, and to be reintroduced when the super is full and is to be removed. From this hive I would banish glasses entirely.

I have introduced six slides into this hive, the ends of which are shaped as shown in the following drawing. On removing the slides, very small ones, about an inch long, must be substituted, to prevent bees coming out at the apertures. On removing the super or top half in July, the little slides are removed in succession, and the long ones intro-

duced, in order to shut off the connection between the upper hive, or bee-master's portion, and the lower, or the queen's. When you remove your portion, a zinc plate eighteen inches square is



pressed in between the upper and lower boxes, and the upper carried away on it. But this is not always necessary, as I will subsequently show in describing the Ayrshire hive.

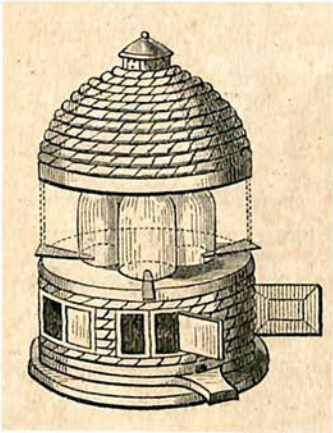
I prefer the hexagonal shape, not from any

theory, but from practical experience; and if this hive can be constructed at less expense, it will prove alike popular and profitable. Its price may be reduced by substituting a plain glass window in each section, with a slide shutter instead of door and hinges, retaining all its seasoned wood and thorough workmanship, while lessening its merely decorative features.

The hive-box I have found unfailing in results—is the Scotch or Ayrshire hive. It is octagonal in shape; the lowest box is six inches high, and rather wider than a large common straw hive. There are three octagonal boxes in all, the top of each having parallel slits from back to front, with slides corresponding, and withdrawn when required. In May, you place your first super box on the top of the lowest or stock hive, fitting and corresponding in all respects; you withdraw backward each slide, introducing as you do so a little slide about an inch in length, to prevent the egress of the bees behind. There is no possibility of escape in front, from the end of

each slide being filled up by the wood of the box.

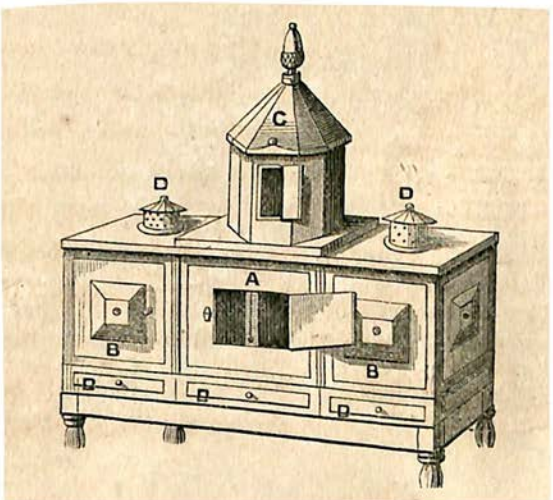
As soon as this first super is filled, you place on it another, or third; withdraw the slides on the top of the second as you did from the top of the first, and let the bees ascend still higher. A small glass window in each, with a sliding shutter, enables you to report progress. At the honey harvest, you remove each super as I have previously directed; and it must be a very bad summer that does not end as the bee-master would prefer.



Of all straw hives, Neighbours' is the most beautiful and lasting. With the super hive lifted up, you see three bell-glasses on the flat top of the stock hive, the zinc slides being withdrawn. The cost is thirty shillings. Prefer-

able to three glasses is one flat glass, about six or eight inches deep. Bees prefer united to separate action in treasuring up their stores. But either with three small glasses or one large one, it is a very elegant and serviceable hive.

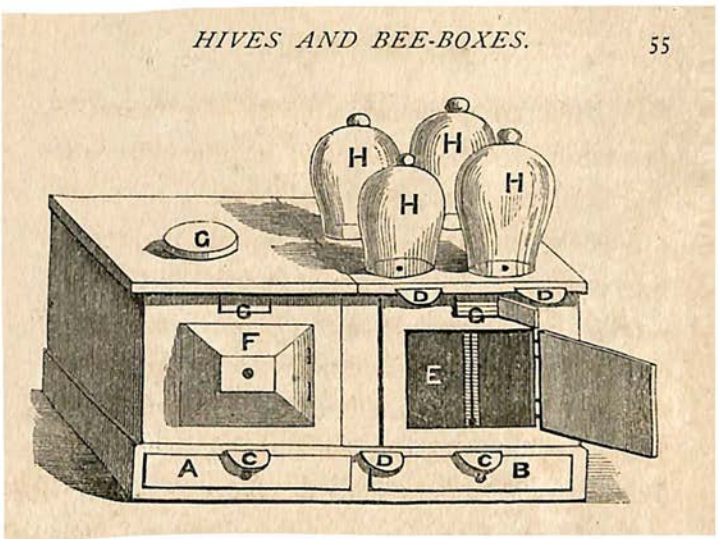
The collateral system of bee-hives has, however, many able and enthusiastic advocates. Nutt is the great advocate, if not the inventor, of this bee-box. As a system for ventilation and facility of deprivation it is unrivalled. His collateral hive, suitable to be placed in a bee-shed, is as below.



A is the stock hive, into which the swarm is introduced and the queen resides; the glass window is open. B B are the side boxes, right and left, having, either in the sides nearest the central box or in the floor, extending right and left, a subterranean communication. C is the cover of a bell-glass: so far in deference to the storifying system. D D D D D are means of ventilation,—above by perforated zinc cupolas, and beneath by drawers, which may be opened or shut as required.

But for every excellence and capability of which the collateral hive is susceptible, Pettitt's is undeniably the happiest and best. I give his own description and woodcut:—

"A is a block front to open for ventilation, also for the egress of the bees from the box F when filled. B Feeding apartment. C C Ventilating slides. D D D Dividers. E "Pavilion of Nature." F Surplus box. G G G Ventilators. H H H H Glass surplus hives. The finest specimen of glass honey in the Great Exhibition was taken from one of these hives. They are of such easy and safe access, that they can be approached at the back at mid-day, when the bees are in full work, without giving them any disturbance whatever. The parent hive is provided with apertures for four glasses upon the top, through which the *drones* cannot pass. These hives are intended for the inside of the apiary, gentleman's library, or attic."



The apertures on the top, which is the retention of the storifying system grafted on the collateral, are all he describes, and a real and valuable device. The price, two guineas, is, for so excellent a bee-box, most reasonable. I can testify from experience that the material is thoroughly seasoned, and the workmanship perfect.

But I still retain my conviction that the collateral system is not productive. The objection to the storifying system, that the bees have more fatigue in climbing than in travelling on the same

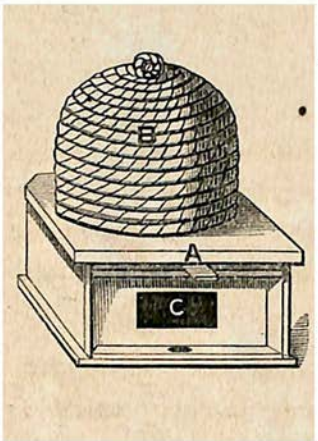
level, is not tenable. The bee prefers to ascend; it traverses the roof as easily as the floor; it begins its work on the roof, and evidently ignores the difficulty which Nutt and others have invented. The side boxes, also, are too cold; the heat of the pavilion, or stock hive, ascending more easily than radiating sideways. Comb-building requires a certain temperature, without which it is impracticable. Hence, in storifying and collateral hives both, when the weather is cold and ungenial, I cover up as much as possible with brown paper, in order to keep in all the heat generated by the bees. Taylor, the most sensible and practical of apiculturists, thus describes his experience of collateral hives:—

"Another point on which Nutt laid much stress may be mentioned, viz., the supposed advantage to the bees in working on one level, without the necessity of *climbing*, as in storified hives. I long thought this was indisputable. Further consideration led me more minutely to examine the habits of the bee in this respect, and I became convinced that nature had given it equal facili-

ties for moving in every direction. A scientific correspondent thus writes on this subject:—'I once propounded the question to a very eminent mathematician, and his reply was, that, if any, the difference was too minute to admit of calculation between the horizontal and the perpendicular movement; it was, in the language of the present day, infinitesimal.' Although few of Nutt's positions have been found to stand the test of practice, it ought not to be said that his crude speculations and rash assertions have been altogether without useful results, as they undoubtedly led to farther investigation, and several modern improvements had thus their origin."

I do not wish to take up space by explaining the nether or nadir system. The simplest description would be:—The common straw hive placed on a square box, six inches in depth and twelve inches square, having a window behind for observation. An aperture is in the floor of the box, having a movable zinc slide, to be withdrawn when the bees are required to descend. This they will do when room is denied above. But the nadir-box is apt to be cold, and the queen is apt to treat it as

part of the stock hive when it becomes warm, and to lay her eggs and rear her young in it, and so spoil your harvest.



A is the nadir-box, on which the hive B — the common straw hive — stands; C is a pane of glass, and A is a moveable zinc slide for opening or shutting communication between the nadir and the hive. It is not a wise or useful plan.

V.—HOW TO GET BEES.

THE best and most effective plan is to buy a swarm as early in May as possible.

The farther off from your bee-garden the swarm is brought the better. I have invariably found that a swarm from a hive a mile or two off is preferable to a swarm from one of your own hives.

Send your bee-box or hive to some cottager who keeps bees, about the end of April. Explain to her or him how the hive is to be adjusted on receiving the swarm, and request that it be carried by hand, if possible, the evening of the day on which the swarm was hived. Let a piece of gauze be placed

over the entrance of your hive, in order that the bees while prisoners on the journey may have plenty of air; and when it arrives place it quietly on your bee-shed, remove without noise the gauze, and next morning, if it be fine, the bees will make themselves masters of the situation, and make up their minds and arrange themselves to work in that place in which their bee-master sets them.

Should the weather, the day after you have placed the hive containing your swarm in your bee-shed, turn out wet and cold, push into the hive through the entrance hole a couple of sticks of barley-sugar, or more. Half-a-pound only costs sevenpence, and you will get it all back in due time; thereby the bees will start with renewed strength, as soon as the weather clears up, most grateful for a little help when help is most required. You need not fear lest by so doing you will encourage idleness or mendicancy. Bees are not like street beggars. They do not want to be dependent. All they ask is a little help at the beginning, to be able then to help themselves. As soon as the sun shines the

swarm will work hard and without cessation, and by the middle of June you may find it right to open communication with a super, or at least with a bell-glass, and find yourself very soon rewarded with honey of exquisite flavour, in cells of unrivalled whiteness.

Richardson and Wildman thus teach how stocks are to be obtained :—

"A stock of bees is usually to be obtained by purchase, although it may indeed chance that you get an opportunity of hiving a 'vagabond' swarm which may have settled in your garden or orchard. In the latter instance, indeed, I think your property in the stragglers somewhat questionable, and perhaps scarcely more so than it would be in a stray ox or sheep, which accident had driven into your premises.

"You may procure stock either in the spring or autumn. I should prefer the former period, because that is the fitting time for removal of stocks from the old-fashioned awkward hives to the more improved modern receptacles; but it is more difficult to ascertain the exact condition of the stock you are about purchasing in spring than it is in autumn. I am sorry to say, that unless you purchase

your stock from a friend, or from some one, at all events, that you can confidently depend on, you are very likely to be taken in, and must therefore be upon your guard against imposition. As some writer (I forget who) quaintly enough remarks, 'Let it be with the bees as with a wife—never *take them on the recommendation of another party.*' If you would purchase a stock in early spring, just after the bees have been removed from their winter quarters, you need not attempt it unless from a person on whose honour you can positively depend. During the months of May or June, you can form some judgment for yourself, and, if you act cautiously, may perhaps bid defiance to trickery. In this case, you should visit the garden or other locality in which the hive stands that you intend purchasing, about mid-day; stand opposite to it, and observe attentively the actions of its inhabitants. If they crowd busily in and out of the hive, giving evidence of their industry by the laden appearance of their legs, and altogether exhibiting a busy *earnestness* in their toils, you may safely buy the hive; and if you obtain this hive before swarming has taken place, you may look upon yourself as a fortunate man.

"If the object of your intentions be an autumnal hive, you had better ascertain that the massacre of the drones has taken place: an observation of the stand and of the

ground around the hive will tell this. Observe the actions of these bees—see that they are lively and industrious; and if, on your too near approach, one or two bees dash at your face, do not be alarmed, but rather regard their pugnacity as a sign of vigour, and buy the hive. Some writers speak of the necessity of purchasing only such stocks as are in nice new hives. This is an advice very necessary to be attended to; but it would not be so, were you sure that the interior of the hive were filled only with honey-comb, and with no old worn-out comb, the accumulation of years. If you are in doubt on the subject, you should *fumigate* the hive in the evening, in the manner hereafter to be described; then, turning up the hive, you can readily ascertain the character of its contents. If the comb be black, have nothing to do with the stock. The genuine colour of the comb is white, and, consequently, the lighter it is, the more the stock is to be esteemed.

"Never, unless you can depend on the party, *send* your hive to receive a swarm; for you may, if you do, have a *second* swarm imposed upon you for a *first*—a comparatively valueless stock for just the very thing you desire. The first swarm begin the formation of the combs at the *middle* of the apex of the hive; the *second* does so at the *side*. These are the only criteria I can furnish, for neither

weight nor bulk are to be depended upon. It is to the obstinate use of the old-fashioned hive that these difficulties, and these opportunities for fraud, are attributable. Were the improved system once established, these cautions would be no longer called for. For old Wildman I entertain a very high respect, although in some instances I am compelled to differ from him; yet I always investigate closely the point at issue between us ere doing so, and, if I doubt, I suffer the weight of his authority to act as a 'casting vote.' Wildman has given some good advice as to the purchase of stocks; and in this advice he speaks like an oracle. Attend to him :—

"'The person who intends to erect an apiary should purchase a proper number of hives at the latter end of the year, when they are cheapest. The hives should be full of combs, and well stored with bees. The purchaser should examine the combs, in order to know the age of the hives. The combs of that season are *white;* those of a former year are of a *darkish yellow;* and when the combs are *black*, the hives should be rejected, because old hives are most liable to vermin and other accidents.

"'If the number of hives wanted have not been purchased in the autumn, it will be necessary to remedy this neglect, after the severity of the cold is past, in the

spring. At this season, bees which are in good condition will get into the fields early in the morning, return loaded, enter boldly, and do not come out of the hive in bad weather, for when they do, this indicates that they are in great want of provisions. They are alert on the least disturbance, and by the loudness of their humming we judge of their strength. They preserve their hives free from all filth, and are ready to defend it against every enemy that approaches.

"'The summer is an improper time for buying bees, because the heat of the weather softens the wax, and thereby renders the comb liable to break, if they are not very well secured. The honey, too, being then thinner than at other times, is more apt to run out at the cells, which is attended with a double disadvantage—viz., the loss of the honey, and the daubing of the bees—whereby many of them may be destroyed. A *first* and strong swarm may indeed be purchased: and, if leave can be obtained, permitted to stand in the same garden until the autumn; but, if leave is not obtained, it may be carried away in the *night*, after it has been hived.

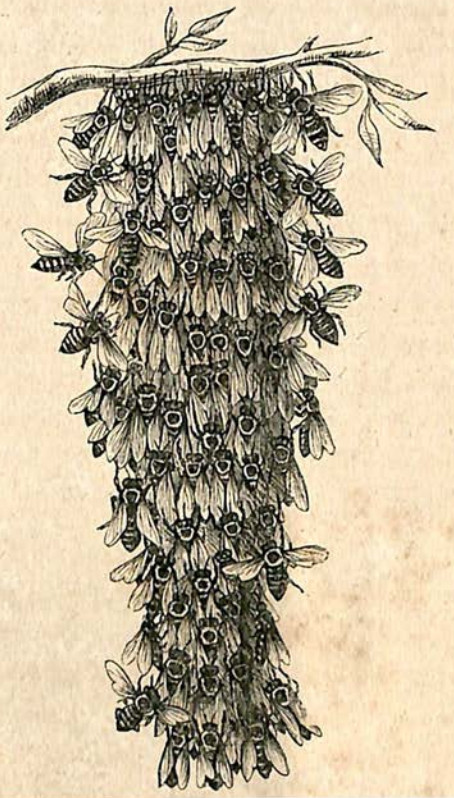
"'I suppose that, in the stocks purchased, the bees are in the hives of the old construction. The only directions here necessary are, that the first swarm from these stocks should be put into one of my hives; and that another of

my hives should, in a few days, be put under the old stock, in order to prevent its swarming again.' "

But perhaps you have a swarm from one of your own stock hives,—not so desirable as the purchase of a swarm from a neighbour. A swarm will occasionally emerge from hives and bee-boxes, in spite of every plan of preventing it. The signs of swarming are some of them appreciable by the most expert bee-master only. A common sign of the emergence of a swarm is inactivity in work, and about the hive clusters hanging from the bee-board—arising, probably, from the old queen finding no princess ready to take her throne—and a high temperature within. If, in addition, the weather is moist and warm, the issue of a swarm may be expected. From ten o'clock to three has been stated as the period within which swarming occurs. Every swarm I have had for twelve years has issued between twelve and three.

A strong swarm will consist of from ten thousand to twenty thousand bees; a caste, or second swarm, of five thousand. Two thousand bees fill

a pint measure. Scouts are generally sent out to select a residence for the young family. House-seeking is an arduous work for human tenants, and no doubt the pioneer bees find great difficulty in fixing on what seems to them suitable. I have seen them settle under the leaves of a standard rose, sometimes on the bough of an apple-tree, and at other times in a sheltered recess in a laurel-hedge. No sight is more exciting than that of a swarm of bees. The air is clouded with the circling bees—vocal with their united music, while the eyes of the bee-master quietly watch their descent. As soon as the queen settles, the bees cluster around her and hang from the branch on which she has settled. As soon as the great mass has settled, take your bee-box or hive, hold it with one hand, mouth or bottom upward, beneath the swarm, enclosing as many of the pendent bees as the situation will allow. With the other hand shake the bough from which they hang, and on the great mass tumbling into the hive, carry it away half-a-dozen yards; set it upright on the bottom



board, or a white sheet previously spread on the grass; raise the edge of the hive with a piece of wood or stone a few inches from the ground, and

cover the hive with a branch or two to keep off the direct rays of the sun. If the queen be inside the hive, the bees that are already inside will remain, and you will find the bees that linger about the branch on which they first settled steadily enter, and by sunset they will all be within. If the queen has not been caught, and still remains on the bough or branch on which the swarm first settled, the bees will leave the hive and re-cluster as they were. You must then repeat the process. You need not be afraid of stings. But if your nerves do not respond to your convictions, begin by spreading a square of gauze over your hat, the brim of the hat keeping it from your face; push the ends and corners under your coat, buttoning it to the chin. This will protect your face, ears, and neck, and a pair of worsted gloves will protect your hands. But practice will dispel fear, and save you from the necessity of such defences. If this homely and cheap defence seem to you insufficient, you can purchase at Neighbours', in Regent-street, for five shillings, a perfect fit.

It is thus represented by its inventor in Messrs. Neighbours' list.

"Is made of light net, called *Leno*, fits over the hat or cap, with sleeves tied at the wrists, and strings at the bottom to draw and fasten round the waist, the sleeves being made of a stronger material. Price 5s.; by post, 6s."

If you have more than one bee-shed, do not place the young colony in the shed in which its mother hive stands.

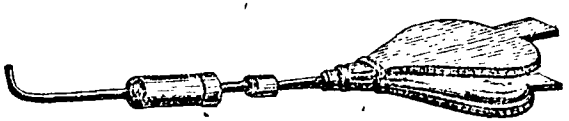
A few straggling bees often hang about the branch next day. Lay on it a few nettles, and they will speedily forsake it, and return to the hive from which they issued, where, of course, their labours are not lost to the bee-master.

Sometimes a caste, or second swarm, will issue from the same hive. These are occasionally feeble in comparison of the first swarm. Are we to preserve it, and make the most of it? or are we to unite the weaker and later caste to a stronger one? Almost all apiarians recommend the uniting of two weak castes, in order to make one strong family, or uniting the feeble swarm to an old stock. Mr. Cotton, the most affectionate of bee-masters while he lived, advocates the use of the usual anæsthetic, fuzz-ball or puff-ball, or frog's-cheese; and while the bees are in a state of insensibility pouring the one family into the hive of the other. The instrument employed for this purpose is made of tin plate.

The ignited puff-ball, which may be gathered and dried, or purchased for a trifle from Neighbours' in London, or Pettitt in Dover, is placed in the box A. The part B is then fitted into A. The orifice D is introduced into the hive, a little rag or clay is

packed round it to keep in the smoke. The mouth is to be applied to the end C, and thus the smoke is driven into the hive. The bees will soon become still as death. The queen had better be picked out and removed from the caste.

The tube of an ordinary bellows may be introduced for this fumigation, as perhaps more effective and less troublesome. It will then appear thus :—



Richardson describes another plan :—

"Some persons may conceive it to be a difficult matter to come at the queen. When fumigation is resorted to, she is, of course, easily discovered; but even when it is dispensed with, and the practice adopted which I have yet to describe, she is not so very difficult to come at; for, on a hive being turned up and *tapped*, the queen is among the first, if not indeed the very first, who makes her appearance, as if to discover the occasion of the unwonted disturbance; and recollect, that although the

dusk of an *autumnal evening* answers best for this purpose, I say nothing indicative of my disapprobation of the use of a *lantern*. The queen usually lodges near the crown of the hive, and is, when fumigation is resorted to, one of the last to fall; she will consequently, in this case, be found amongst the uppermost bees. In practising fumigation (with a view to the union of weak stocks), two persons should act in concert, each taking a hive and operating upon it, in order that both stocks should be simultaneously in a similar condition as to *intoxication*. I may add, that in fumigation the hive must be well covered with a cloth, to prevent the escape of the smoke. When you have united the two stocks in the manner I have described, it is advisable to confine the insects to their hive for that night and the following day. Do not, however, wholly deprive them of air in doing so, or you may smother them."

Taylor, who is always judicious, proposes what I regard as a preferable plan of uniting weak swarms :—

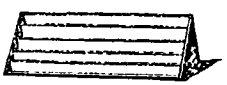
"Like most other operations on bees, the mode of uniting swarms admits of variety, according to choice and circumstance; and some apiarians prefer to drive them, in the way for which general directions have already been

given; a plan that may be resorted to almost at any time. Another mode of junction can be effected by the aid of a sheet of perforated zinc, inserted between the two hives about to be united. There is little reason to doubt that the members of each colony of bees are distinguishable amongst themselves by a certain peculiarity of odour, which, if assimilated, appears to have the effect of preventing mutual dissension. When the construction, therefore, of the hives admits of their being brought into juxtaposition, the perforated zinc allows a free circulation of scent between them, without permitting actual contact of the bees. After leaving matters in this position for two or three days, I have usually found, on withdrawing the zinc divider, that no disturbance has ensued."

But may it not be preferable still to follow the course indicated by the bees? When pastures fail and turnips perish, from an extreme dry season, we feed cattle with artificial food. Why not try an analogous system with bees? Barley-sugar, I admit, is expensive. But I venture to assert, that if the caste issue not later than June, four pounds of barley-sugar, costing about five shillings, will supplement its own industrious gatherings suffi-

ciently to carry it over the winter into spring, and a pound in spring will start it into vigorous work. If you take from it a super next June or July, weighing ten or twelve pounds, you receive good interest, and your outlay for barley-sugar is returned, and you escape the troublesome and disagreeable process of fumigation. Barley-sugar, I admit, is more costly than cottagers prefer. If you have no arrangement in your hives for feeding, you may boil a pound of common brown sugar—which may be had for fourpence a pound—in a pint of ale; pour it when cool into a soup-plate. Take a circular thin board, the size of the inner bottom of the soup-plate, pierce it with a good-sized gimlet in every direction till it is covered with holes, each through and through. Let it float on the plate. Set the plate opposite your weak swarm day after day for a week. The other bees, strong and busy in June, will rarely touch it, and your destitute family will gladly visit it. The weight of the float will make the sugared ale ascend by the holes, and the bees will sip *ad*

libitum, without the risk of clogging their wings or being drowned. But if, what is more to be desired, you have one of Pettitt's single-box hives, you have only to fill one of his wood feeders, in which there



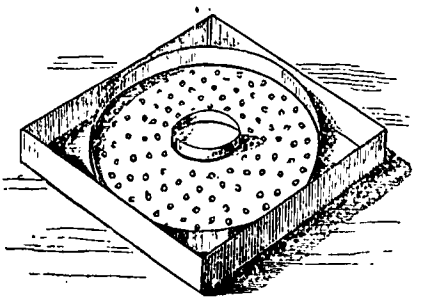
are grooves and parallel edges of wood for the bees to walk on; place it in the drawer beneath the stock, draw out the zinc slide, and the bees will descend and feed with profit and pleasure.

If you have one of Neighbours' hives, already referred to, fill the following zinc pan with the ale and sugar. Put over it the plate of glass, and fix it on the top of the hive. The bees will ascend by

the orifice A, the plate-glass cover on the top preventing their escape, while it is so constructed that without moving it you can replenish it by the entrance B.

Taylor thus describes one of his feeding-pans:—

"When there is a hole in the centre of the top of the hive, a trough may be used, made of tin or zinc, seven or eight inches square, and one inch and a quarter deep; having a circular two-inch hole in the middle of the



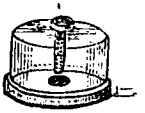
bottom, with a rim round it, standing up half an inch, through which the bees enter the pan from below. Another circular rim or partition, as large in diameter as the square of the pan will admit, is soldered down within it at the four points where it touches the sides. It must not go down to the bottom, but a space should there be left of nearly an eighth of an inch, as a passage for the food, which is poured in at the four angles. A perforated thin wooden bottom or float is fitted loosely into the pan, between the circles, removing an objection sometimes made against the chilling effects of metal upon bees.

The float should be a little raised by means of two thin strips of wood, appended below, to allow the liquid to flow beneath. A cover is made by a piece of glass, resting on the larger circle, but cut nearly octagonal in form, so as to leave the corners open. The circle on which the glass rests should be an eighth of an inch lower than the outer rim."

Ingenious bee-masters, who estimate the excellence of their treatment by its tortuous ingenuity, are sure to deride every such homely and easy treatment. But you must disregard their learned and, as they phrase it, scientific talk. In fact, the sulphur-and-match treatment is scarcely worse than the protracted torture of apiarian inquisitors, inflicted on bees by means of their ingenious hives! Experimental investigations are, of course, legitimate. But keeping up queer and twisted and zigzag bee-houses, as monuments of their talent and nothing else, is nothing less than vivisection of bees.

Should the weather prove fine, and the stock hive, as inspected by the glass window, show the honey-comb reaching downward to the floor, place a super

on the top. A glass is by far the most elegant, and, of the shape recommended by Taylor, it is the most useful. It is about ten inches wide, six inches high, and straight on the sides, with or without a zinc circular perforated tube.



But it is essential to cover it with a fitting woollen nightcap, the neglect of which is the cause of the unpopularity of bee-glasses.

No additional room ought to be given after the middle of July, even in heath counties; but that supplied in the beginning of June, or toward the end of May, should be large. This is the safe side to err on. Either one good large glass, or, what is less useful, two or three middle-sized, should be used.

In the case of the Ayrshire hive, the rabbet-slides should be drawn out from the top of the bottom box, the super box being previously placed on the top.

During June and July frequently visit your bees.

Stand in front of the bee-shed. Study them through your observatory windows. They are too busy to be annoyed. They love company. They are essentially social and friendly, and fond of visitors. Their music will charm your ear, and their industry delight your eye; and their wonderful work will give you many an illustration for sermon, essay, or speech.

The longest summer ends in autumn. The honey harvest comes on.

Pass your zinc plate under the full glass. Detach it, and lift it off the stock hive, of which close up the hole, or place on it a very small bell-glass, just sufficient to cover the aperture, not forgetting the nightcap. Take your glass to a little distance, let it rest for half an hour, then edge up one side, and the bees will rush home to their hive in the bee-shed. Cover the bottom of the glass, when the bees have left, with parchment or thick writing-paper.

Mr. Taylor's directions are as follow :—

"If the queen is not in the super (and she seldom is there after it is filled), the silence that at first prevailed

will be exchanged for a murmuring hum, attended by a commotion among the bees; and they shortly after begin to quit the super, without attempting any attack. Should the queen be present, however, a very different scene would ensue, and a hubbub would then commence in the stock hive; though the loss of their queen is sometimes not discovered by the bees for a considerable time. In such a case, the box must be reinstated in its former position, and the communication reopened till some other day. The process might happen to be complicated by the presence of brood, for this the bees leave very reluctantly, and often not at all. In an emergency of this kind, it is best to restore matters to their previous state, and let the super remain till the brood is perfected. A little patience is sometimes necessary; but all attempts at ejection of the bees by tapping, smoking, or driving, usually do more harm than good. So long as they continue to leave the super, it may remain where it is, for on these occasions young bees are sometimes numerous; and if the super is removed, though only to a short distance, these are in part lost, not having become sufficiently acquainted with the position of their home; or, if they enter a wrong hive, they pay the penalty with their lives. This freedom from disturbance has the further good effect of preventing in a great degree the intrusion of robber

bees, readily distinguishable from the others by their hovering about the box, instead of flying from it. These are strangers from various quarters, immediately attracted by the scent attending the removal of a full box or glass. Should a few of these plunderers once obtain a taste or sample of the honey, they speedily convey the good news to their associates, when large reinforcements from every hive in the neighbourhood will be at once on the alert, and quickly leave nothing behind but empty combs. Let the separated super, therefore, not be left or lost sight of, but if scented out by robbers, be conveyed into some room or outbuilding, to prevent a general battle, and which might extend itself to all the neighbouring hives. The remaining bees may here be brushed out, escaping by the window or door. Mr. Golding has sometimes found the advantage of using for the purpose a darkened room, with the exception of a very small aperture, to which the bees will fly and make their exit. Others like to remove a super at once to a short distance from the stock hive, leaving it shut up in perfect darkness for an hour or two. Its edge is then raised up, when the bees will evacuate it."

A good plan is, to take the detached super into a room with a window that closes and opens on

hinges. On edging up the glass, the bees will fly to the window. Open it for a minute, and they will escape. Shut it again, and repeat the opening. The advantage of this is that wasps and strange bees are excluded, such corsairs careering everywhere in autumn.

Honey is always best preserved in its own sealed and air-tight cells. It will keep throughout the winter. If you separate the honey from the wax, cut the combs into inch-wide pieces, and lay these in sieves over glazed earthenware vessels, and they will yield the choicest honey. It drops from the comb spontaneously.

Take the combs and squeeze them through a cloth. This will yield a second-class honey, admirable for feeding your bees. Carry the remainder, or refuse, in a dish, and place it before your bee-shed, and thousands of your bees will make a good meal from it. If you prefer to save the wax, bring back what the bees have licked clean. Put it into a vessel in which there is as much water as floats it. Place the vessel on a clear fire, stirring till the

combs are thoroughly melted. Strain the whole through a fine canvas bag into cold water. Mr. Nutt says:—

"Have ready then a piece of smooth board of such a length that, when one end of it is placed in the tub of cold water, the other end may be conveniently rested against, and securely stayed by, your breast. Upon this inclined plane lay your dripping, reeking strainer, and keeping it from slipping into the cold water by bringing its upper part over the top of the board, so as to be held firmly between it and your breast. If the strainer be made with a broad hem round its top, a piece of strong tape or cord passed through such hem will draw it close, and should be long enough to form a stirrup for the foot, by which an additional power will be gained of keeping the scalding-hot strainer in its proper place on the board; then, by compressing the bag, or rather its contents, with any convenient roller, the wax will ooze through and run down the board into the cold water, on the surface of which it will set in thin flakes. When this part of the operation is finished, collect the wax, put it into a clean saucepan, in which is a little water, to keep the wax from being burned to the bottom; melt it *carefully;* for should it be neglected, and suffered to boil over, serious mischief

might ensue, liquid wax being of a very inflammable nature; therefore, melt it *carefully* over a *slow fire*, and skim off the dross as it rises to the top; then pour it into such moulds or shapes as your fancy may direct, having first well rinsed them, in order that you may be able to get the wax, when cold and solid, out of them, without breaking either the moulds or the wax; place them, covered over with cloths or with pieces of board, where the wax will cool slowly; because the more *slowly it cools*, the *more solid it will be*, and free from flaws and cracks."

To those who have a taste for very ancient drinks, Richardson's instructions will prove valuable:—

"MEAD.—Some persons may feel desirous of making for themselves this once-famous drink, and I shall accordingly furnish them with simple directions for so doing. Common mead is formed by mixing two parts of water with one of honey, boiling them together, and taking off the scum.

"*Fermented* mead is formed of *three* parts of water to one of honey, boiled as before, skimmed, and casked. The cask is to be left unbunged and exposed to the sun, or in a warm room, until it ceases to *work*. It is then bunged, and in about three months it is fit for use. The

addition of a *ferment* is of course necessary, taking care that it be *sound*, *sweet*, and *good*.

"Hops are an improvement to mead, taking from its extreme sweetness; and so is the addition of chopped raisins boiled with it, at the rate of six pounds of honey to each half-pound of raisins; also some lemon peel, a few glasses of brandy, &c.

"METHEGLIN is only another name for mead, altered by the addition of various ingredients, according to the taste of its preparers. These liquors may be *racked*, *fined*, &c., like other wines, and will, if properly managed, keep for years."

I have never tasted these celebrated wines. I have no doubt they are pleasant and wholesome. But I prefer the honey in the honeycomb at breakfast, and mean to recommend it to others also.

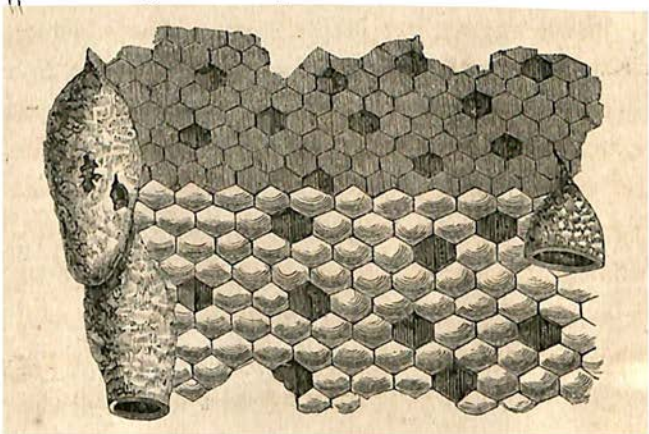
VI.—THE INMATES OF THE HIVE.

IN every hive there are three distinct inmates, very easily recognised—the Queen-Bee, the Working-Bee, and the Drone; each essential to the other, and all to the very existence and prosperity of the hive.

THE QUEEN.

The Queen is very elegant. Her symmetry of

person, and relative proportions, and greater length of figure, distinguish her from the rest of the community. Her death is followed by a cessation of all labour till a princess ascends the throne. She is the creature of treatment. The egg from which she emerges seems in all respects identical with those from which her subjects issue. On the sides of the tier of comb from which drones and working-bees are developed, large vertical combs, from two to five, are constructed. Woodcuts representing these are found in every bee-book. Taylor gives the following accurate picture :—



The upper portion of the comb contains honey, with the exception of the dark cells, which contain pollen. The lower are drone cells; and the large cells, three in number on each side, are royal palaces. Her majesty is fed with royal jelly till she is ready to show herself; and everything that love and reverence and hope can supply, the bees delight to offer. But it is a curious entomological fact, first discovered by Schirach, an eminent apiarian of the last century, that the bees can supply the loss of their queen by an artificial process—a process confirmatory of the position that every working-bee egg has in it the component elements of royalty, and that development according to a definite treatment is all that is requisite to constitute a queen. On being deprived of their queen by death, the bees select a common grub, not above three days old, break down the wax partitions between it and at least three contiguous cells, forming a vertical pear-shaped chamber. They feed her with the daintiest food, called royal jelly. In five days the grub becomes a nymph, and

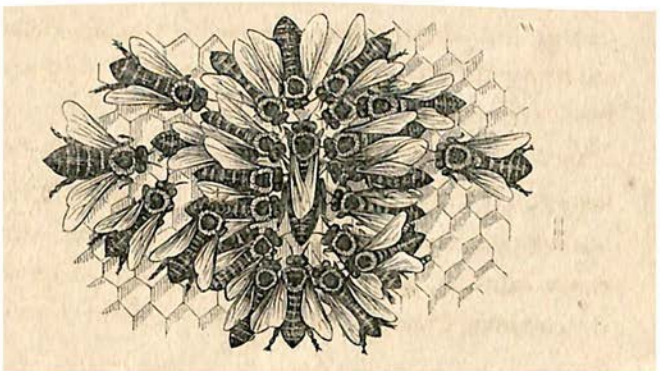
in fifteen she emerges a royal princess, ascends the vacant throne, and receives the homage, loyalty, and love of fifteen or twenty thousand subjects. Kirby exclaims :—

"What! you will ask, can a larger and warmer house, a different and more pungent food, and a vertical instead of an horizontal posture, give a bee a different-shaped tongue and mandibles; render the surface of its under-legs flat instead of concave; deprive them of the fringe of hairs that forms the basket for carrying the masses of pollen,—of the auricle and pecten which enable the workers to use these legs or feet as pincers,—of the brush that lines the insides of the feet? Can they lengthen its abdomen; alter its colour and clothing; give a curvature to its sting; deprive it of its wax-pockets, and of the vessels for secreting that substance; and render its ovaries more conspicuous and capable of yielding worker and drone eggs?"

In spring, she moves among the combs laying her eggs. Ladies-in-waiting accompany her, who always turn their faces toward her majesty, clear the royal route, and clean out the cells in which she deposits her eggs.

Of this Lardner gives the following representation:—

The Reverend Charles Cotton, while he lived the prince of bee-masters, thus represents the queen and her attendant ladies:—



The queen is the central bee; the surrounding bees are her ladies-in-waiting, and the white specks the eggs she has deposited.

The queen-bee is a model keeper at home, rarely leaving the hive. Most apiarians are interested at present in the habits and acclimatisation of the Ligurian bee—the *Apis Ligustica*, or Italian bee. It is found easy to substitute an Italian for a British queen, in a British hive which has been deprived of its native sovereign. The bees refuse to constitute themselves into a republic, and therefore they will accept even a foreign queen, who, no doubt, takes the oaths and obligations of the realm over which she is to reign. There is a red tinge in the rings that surround the abdomen of this foreigner; and, contrary to what we should expect in an Italian temperament, the Ligurian bee is more gentle and conciliatory than our native queen. I speak from report, not from personal knowledge. But I hope one day to be present at a *levée*, and become better acquainted with the royal foreigner.

Lardner gives the following account of two

queens, from Huber. Huber placed a piece of comb having three royal cells in a hive in which the queen was laying eggs. The moment she saw them she attacked them, laid them open, and commanded her attendants to destroy them. These instantly tore out the royal nymphs, and devoured the food destined for their use. He then introduced a stranger queen, pregnant with eggs, marking her so as to be able to identify her.

"Immediately on her appearance the workers collected in a crowd around her, and formed as usual a circle of which she was the centre, the heads of all the remaining crowd being directed towards her. This very soon became so dense that she became an absolute prisoner within it.

"While this was going on, a similar ring was formed by another group of workers round the queen-regnant, so that she was likewise for the moment a prisoner.

"The two queens being thus in view of each other, if either evinced a disposition to approach and attack the other, the two rings were immediately opened, so as to give a free passage to the combatants; but the moment they showed a disposition to fly from each other, the rings were again closed, so as to retain them on the spot they occupied.

"At length the queen-regnant resolved on the conflict, and the surrounding crowd, seeming to be conscious of her decision, immediately cleared a passage for her to the place where the stranger stood perched on the comb. She threw herself with fury on the latter, seized her by the root of the wing, and fixed her against the comb so as to deprive her of all power of movement or resistance, and then bending her abdomen, inflicted a mortal stab with her sting, and put an end to the intruder.

"A fruitful queen full of eggs was next placed upon one of the combs of a hive over which a virgin queen already reigned. She immediately began to drop her eggs, but not in the cells; nor did the workers, by a circle of whom she was closely surrounded, take charge of them; but, since no trace of them could be discovered, it is probable that they were devoured.

"The group, by which this intruding queen was surrounded, having opened a way for her, she moved towards the edge of the comb, where she found herself close to the place occupied by the legitimate virgin queen. The moment they perceived each other, they rushed together with ungovernable fury. The virgin, mounting on the back of the intruder, stabbed her several times in the abdomen, but failed to penetrate the scaly covering of the segments. The combatants

then, exhausted for the moment, disengaged themselves and retired. After an interval of some minutes they returned to the charge, and this time the intruder succeeded in mounting on the back of the virgin and giving her several stabs with her sting, which, however, failed to penetrate the flesh. The virgin queen, succeeding in disengaging herself, again retired. Another round succeeded, with the like results, the virgin still coming undermost, and, after disengaging herself, again retiring. The combat appeared for some time doubtful, the rival queens being so nearly equal in strength and power; when at last, by a lucky chance, the virgin sovereign inflicted a mortal wound upon the intruder, who fell dead on the spot.

"In this case, the sting of the virgin was buried so deep in the flesh of her opponent, that she found it impossible to withdraw it, and any attempt to do so by direct force would have been fatal to her. After many fruitless efforts, she at length adopted the following ingenious expedient with complete success. Instead of exerting her force on the sting by a direct pull, she turned herself round, giving herself a rotatory motion on the extremity of her abdomen where the sting had its insertion, as a pivot. In this way she gradually *unscrewed* the sting."

Another very interesting incident is related by Huber. It is described by Lardner :—

"The first work which the population undertakes, after being assured of the loss of its queen, is directed to obtain a successor to her. If there be not royal cells prepared, they set about their construction. While this work was in progress, and in twenty-four hours after their queen had been taken from them, Huber introduced into the hive a fruitful queen in the prime of life, being eleven months old. Not less than twelve royal cells had been already commenced and were in a forward state. The moment the strange queen was placed on one of the combs, one of the most curious scenes commenced which was probably ever witnessed in the animal world, and which has been described by Huber.

"The bees who happened to be near the stranger approached her, touched her with their antennæ, passed their probosces over all parts of her body, and presented her with honey. Then they retired, giving place to others, who approached in their turn and went through the same ceremony. All the bees who proceeded thus clapped their wings in retiring, and ranged themselves in a circle round her, each, as it completed the ceremony, taking a position behind those who had previously offered their

respects. A general agitation was soon spread on those sides of the combs corresponding with that of the scene here described. From all quarters the bees crowded to the spot, and each group of fresh arrivals broke their way through the circle, approached the new aspirant to the throne, touched her with their antennæ and probosces, offered her honey, and, in fine, took their rank outside the circle previously formed. The bees forming this sort of court circle clapped their wings from time to time, and fluttered apparently with self-gratification, but without the least sign of disorder or tumult.

"At the end of fifteen or twenty minutes from the commencement of these proceedings the queen, who had hitherto remained stationary, began to move. Far from opposing her progress or hemming her in, as in the cases formerly described, the bees opened the circle on the side to which she directed her steps, followed her, and, ranging themselves on either side of her path, lined the road in the same manner as is done by military bodies in state processions. She soon began to lay drone eggs, for which she sought and found the proper cells in the combs which had been already constructed.

"While these things were passing on the side of the comb where the new queen had been placed, all remained

perfectly tranquil on the opposite side. It seemed as though the bees on that side were profoundly ignorant of the arrival of a new queen on the opposite side. They continued to work assiduously at the royal cells, the construction of which had been commenced on that side of the comb, just as if they were ignorant that they had no longer need of them; they tended the grubs in those cells where the eggs had been already hatched, supplying them as usual, from time to time, with royal jelly. But at length the new queen in her progress arriving at that side of the comb, she was received by those bees with the same homage and devotion of which she had been already the object at the other side. They approached her, coaxed her with their antennæ and probosces, offered her honey, formed a court circle round her when she was stationary, and a hedge at either side of her path when she moved, and proved how entirely they acknowledged her sovereignty by discontinuing their labour at the royal cells, which they had commenced before her arrival, and from which they now removed the eggs and grubs, and ate the provisions which they had collected in them.

"From this moment the queen reigned supreme over the hive, and was treated in all respects as if she had ascended the throne in right of inheritance."

THE WORKER-BEE.

The Worker-Bee is an imperfectly developed queen or female. The worker-bees vary in number in a prosperous hive from ten to twenty thousand. They are divided into orders or sections. Some produce wax; others build combs; others feed the young; others ventilate the hive; others, as sentinels, guard the entrance; while the great body traverses gardens and commons, gathering honey for themselves and the bee-master. There are various estimates of the age of the worker-bee. Dr. Bevan thinks the limit of their life is six or eight months. Probably this is the average, from taking into account the accidents of a laborious life, the battles they must wage with enemies, and the wear and tear of ceaseless toil. About the end of August they appear exhausted; their wings become ragged, and the stroke of the sting feebler.

THE DRONE.

The Drone is a male bee, fat, round, and lazy,

like an old abbot in mediæval times, who preferred the cellar to his cell.

Huber remarks :—

"Naturalists have been extremely embarrassed to account for the number of males in most hives, and which seem only a burden on the community, since they appear to fulfil no function. But we now begin to discern the object of nature in multiplying them to such an extent. As fecundation cannot be accomplished within the hive, and as the queen is obliged to traverse the expanse of the atmosphere, it is requisite that the males should be numerous, that she may have the chance of meeting some one of them. Were only two or three in each hive, there would be little probability of their departure at the same instant with the queen, or that they would meet in their excursions; and most of the females might thus remain sterile."

The queen selects a drone for her husband, who dies invariably at the end of the honeymoon or wedding-trip in the air. But the widowed queen does not marry a second husband. Her whole mind from that day to her death, though surrounded by two thousand suitors, is devoted to the

interests and order and government of her realm. During May, and not later than June, the massacre of the drones takes place. They have become at this date encumbrances only. Their mission is ended, and their extermination becomes the duty of the industrious bees. I stated, in my letters to *The Times*, that I believed the drones had a value additional to that usually assigned to them—viz., that they sustained the temperature of the hive during the chief breeding season. Mr. Cotton—no mean authority—states what substantially confirms all I said :—

"I have watched the drones for many years very attentively, and I will freely give you the result. I will tell you, in the first instance, the facts I have seen, and what I have drawn from them. The drones are hatched just before the new swarms rise ; very few go off with them. I for a long time thought that none did ; but I am free to confess that I was wrong. They do not fly out early in the day, but about two o'clock they go out to take the air, and make a fine buzzing, which joins very prettily with the milder hum of the bees. Many people kill the drones directly they see them ; but they

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are quite wrong, as the bees know best when they have done their duty, and so we may leave to them the unpleasant task of killing them, though they do not do it in the most merciful way.

"Why do the drones stay in the hive all the morning? Most of the bees are then out gathering honey, so the drones have to stay at home to keep up the heat of the hive by their great fat bodies, just as a gadding wife leaves her husband to look after the children, while she is out taking her pleasure."

It does seem a too great excess of provision to furnish two thousand drones out of whom the queen may select her consort. It looks like unusual waste. It leads to a massacre on a larger scale than is necessary.

The average number of excursions made by each bee is probably ten or twelve, over an area of half a mile; but fewer, of course, in proportion to the greater distance of suitable pasture. Kirby calculates that during a good season a hundred pounds of ponderable material is carried by these tiny workers into their hive. He justly observes:—

"What a wonderful idea does this give of the industry

and activity of those useful little creatures! and what a lesson do they read to the members of societies that have both reason and religion to guide their exertions for the common good! Adorable is that Great Being who has gifted them with instincts which render them as instructive to us, if we will condescend to listen to them, as they are profitable."

VII.—BEE ENEMIES.

THE toad is a lazy, ugly-looking enemy of the bee. His capabilities, however, are not equal to his will and wants. He squats under the bee landing-board, and seizes every too heavily laden or wing-weary labourer that accidentally drops. This is really very cruel. The bee that has finished the longest journey, and gone through the hardest work, and borne the heat and brunt of the hot, long summer day, takes a rest on a leaf just before entering the hive, or comes short of the door of his home by an inch, and is seized by the unclean monster and devoured. The only way of getting rid of this unfeeling destroyer, who sits "seeking whom he may devour," is to pay a visit

to your hives soon after sunrise and an hour before sunset; and on finding him on his wicked watch, seize him by the hind leg and throw him to as great a distance across your hedge as you well can. But if the "bee-master" be a lady—if I may use the phrase—let her empty on him a snuff-box full of strong snuff, and he will reflect a few days before he returns to his old quarters.. I give this prescription to ladies, because they do not like to seize the cold-blooded creature and fling him to a respectable distance. How favoured our Irish bee-masters must be in this matter!—they have no toads. I also wish they had no riots. But troubles must come in some shape. Still, I would rather have toads than Belfast navvies and ship-carpenters, and any day I would prefer being *The Times* Bee-master to be Mayor of Belfast.

We are also exempt in this island of ours from the bear, unless one should break loose from the strolling menageries that occasionally infest Tunbridge Wells Common. "The bear," remarks a Yankee, "is the knowingest varmint for finding out

a bee-tree in the world. They'll gnaw for days together at the trunk, till they make a hole big enough to get in their paws, and then they'll haul out the honey, bees and all."

The moth is a dangerous enemy. During the day there is no risk of his attacks. But during the night he is, like other thieves and burglars, alive and active. "He loves the darkness rather than the light, because his deeds are evil." As no bee-master can do without sleep, I cannot expect of the most enthusiastic and devoted that he will watch his hives the whole night. The only preventive measure of a mechanical sort I can recommend is that of lessening the entrance door. For this purpose he must apply a zinc slide, such as Mr. Neighbour, in Holborn, will supply, which will keep out the moth and yet let out the bees. Besides, the narrower the door, the more closed up the rank of the bee-sentinels becomes, and the more able they are to repel the death's-head moth, or any similar intruder. But the most vigorous prophylactic measure you can take is to keep your

bees in full strength; and as the time selected by these depredators is the early autumn, you cannot do better than give your bees a cup of good strong ale, boiled up with sugar, which will cheer up your whole family, and enable them to put forth their whole strength in grappling with their enemies. Don't mind teetotal objections. These are all very good for drunkards; but for sober, industrious bees, determined to defend their property, a cup of good ale is as kind as it is useful. The *Acherontia Atropos*, or death's-head hawk-moth, not only robs the hive of its honey, but frightens and all but paralyses the bees. Huber gives an account of the exertions of his bees to guard against this formidable foe. It is here quoted from Lardner:—

"When he found his hives attacked and their store of honey pillaged by these depredators, he contracted the opening left for the exit and entrance of the bees to such an extent as, while it allowed them free ingress and egress, it was so small that their plunderers could not pass through it. This was found to be perfectly effectual, and all pillage was thenceforward discontinued in the hives thus protected.

"But it happened that in some of the hives this precaution was not adopted, and here the most wonderful proceeding on the part of the bees took place. Human contrivance was brought into immediate juxtaposition with apiarian ingenuity.

"The bees of the undefended hives raised a wall across the gate of their city, consisting of a stiff cement made of wax and propolis mixed in a certain proportion. This wall, sometimes carried directly across and sometimes a little behind the door, first completely closed up the entrance; but they pierced in it some openings just large enough to allow two bees to pass each other in their exits and entrances.

"The little engineers did not follow one invariable plan in these defensive works, but modified them according to circumstances. In some cases a single wall, having small wickets worked through it at certain points, was constructed. In others several walls were erected one within the other, placed parallel to each other, with trenches between them wide enough to allow two bees to pass each other. In each of these parallel walls several openings or wickets were pierced, but so placed as not to correspond in position, so that in entering a bee would have to follow a zigzag course in passing from wicket to wicket. In some cases these walls or curtains were

wrought into a series of arcades, but so that the intervening columns of one corresponded to the arcades of the other.

"The bees never constructed these works of defence without urgent necessity. Thus, in seasons or in localities where the death's-head moth did not prevail, no such expedients were resorted to. Nor were they used against enemies which were open to attack by their sting. The bee, therefore, understands not merely the art of offensive war, and can play the part of the common soldier, but is also a consummate military engineer; and it is not against the death's-head moth alone that it shows itself capable of erecting such defences."

A correspondent of *The Times*, writing on naval guns, who signs himself "Z," alluded to my letters, and drew a happy illustration from them. Let me here inform the Admiralty of a new arm which in extremity—for otherwise it would be the sacrifice of too many bee combatants—may be used in naval warfare. But perhaps Lord Clarence Paget may find some difficulty in securing its adoption. It is related in "The Naturalist's Library:"—

"A small privateer with forty or fifty men, having on

board some hives made of earthenware full of bees, was pursued by a Turkish galley manned by five hundred seamen and soldiers. As soon as the latter came alongside, the crew of the privateer mounted the rigging with their hives, and hurled them down on the deck of the galley. The Turks, astonished at this novel mode of warfare, and unable to defend themselves from the stings of the enraged bees, became so terrified that they thought of nothing but how to escape their fury; while the crew of the small vessel, defended by masks and gloves, flew upon their enemies sword in hand, and captured the vessel almost without resistance."

But as many of my recent correspondents in *The Times* were clergymen, I can recommend to the ministers of Belfast an admirable prescription for the extreme case of a Belfast mob sacking their rectories and manses. The Mayor of Belfast also might take it into his grave consideration, should the citizens, instead of trying to convert each other by arguments or Scripture, have recourse to those fashionable weapons which they lately wielded with so much effect :—

"During the confusion occasioned by a time of war in 1525, a mob of peasants assembling in Hohnstein; in

Thuringia, attempted to pillage the house of the parish minister, who, having in vain employed all his eloquence to dissuade them from their design, ordered his domestics to fetch his bee-hives and throw them in the middle of this furious mob. The effect was what might be expected; they were immediately put to flight, and happy to escape unstung."

Is not this worthy of the consideration of every peaceful vicar in Belfast?

The spider is also a very mischievous pest in bee-houses. He builds his web in nooks and corners, under the eaves and about the landing-boards, and in the track of the outgoing and incoming bees. When a bee is inveigled, its efforts to extricate its captive limbs serve only to involve it in the toils more hopelessly. I have seen half-a-dozen working bees thus caught and scooped out by the ravenous jaws of the spider. These webs are constructed so rapidly, that nothing short of daily attention will get rid of them. The best thing is, to have the bee-house as smooth inside as it can be made, with as few projecting edges and points as possible;

and in the next place, the daily use of a hard, dry painter's brush will sweep them away as fast as they are made, and probably their weavers with them.

Finally, the worst enemy of bees is man. There is the barbarous, cruel, and ungrateful treatment of the brimstone match. The little innocents have toiled all the summer. They have thrown off a swarm—after the example of the Church of Scotland, which, by way of showing its internal strength, threw off a capital swarm in 1843—they have recovered all the effects of their secession, and amassed abundance for future days. The bee-cide felon, called man, digs a pit, lights four ounces of brimstone inside of it, and deliberately sets fifteen thousand bees, queen and all, above its really and truly infernal fumes—suffocates and burns the unhappy martyrs, and then subscribes to various charities in winter, and calls himself a philanthropist! He ought to be sent to the treadmill. Why does the Society for Preventing Cruelty to Animals take up the case of cab-horses, and overlook the murdered

bees? But there are regular inquisitors who do not use sulphur. Those scientific crinkum-crankum hives, from which bees with difficulty get out, and with more difficulty get in, are little purgatories, over which the inquisitors preside. Vivisection is no worse. Yet these men complain that all who advocate simple, easily accessible, and comfortable homes for bees are behind the age, and ignorant of apiarian progress! There are not more than three sorts of hives that are humane. All the others bewilder the brains, weary the legs, and spoil the tempers of the best bees that ever dwelt in a hive. I have no objection whatever to ornamental bee-sheds; but the hives which are the dwelling-places of my bees should be as plain as possible, comfortable, warm, and easy of exit and entrance. A very gifted preacher said it took all his learning to make his sermons plain: it ought to take all a bee-master's to make his hives simple. When I hear a fine preacher expressing himself in grand words and glittering figures, I always feel—I hope not uncharitably—that he cares more about dis-

playing himself than serving his Master or feeding his flock. Even so I am tempted to think of the ingenious inventors of intricate labyrinths they intend for hives,—that their own fame as apiarians is their chief thought, and the comfort of their bees their last and least consideration. A careless, inattentive bee-master is criminal. He ought to see that his bees have a sufficiency of food at the close of the year. In fine October weather he may place several soup-plates filled with ale and sugar well boiled together, and covered with perforated wooden floats, which sink as the bees sip the contents, opposite his hives. I never find any quarrel ensue, though I have seen thousands of bees from different hives feed together for hours. After October till March no liquid food should be offered; but a stick of barley-sugar may be thrust in now and then. The bees will not descend to taste it in too cold weather, and during a warm day they will enjoy such a dessert. In case of damp within the hive, which, when a glass is retained, may be seen inside of it, select a warm day, remove the glass,

and close the aperture in the hive. Wipe the interior of the glass with a linen cloth till perfectly dry, and replace it as before. But a little artificial ventilation on a dry, warm day is still better.

Do not let your bees find by painful experience that their bee-master is their worst enemy.

For an account of wasps, see my letter to *The Times*, page 157.

THE BEE-MASTER'S LETTERS TO "THE TIMES."

SO many and so urgent have been the requests of my correspondents to reprint these letters, that I have carefully gone over them, corrected clerical errors, and reproduced them. They may amuse as well as teach. I append them in the order of their appearance. They were unfortunate enough to provoke the wrath of two or three hive-inventors or patentees, the merits of whose crooked and uncomfortable productions the writer could not appreciate; but they have received the warmest eulogies of great

numbers to whom they conveyed new and interesting information.

It is a pity that petty jealousies should distil their poison on so pleasant a theme, and that bees should in this case turn wasps.

A very curious coincidence occurred in the course of the correspondence on bees which appeared in *The Times*. A succession of letters appeared in various more or less obscure newspapers, beginning at Exeter and moving northward to the Orkneys, each, *mutatis mutandis*, the repetition of the first. They invariably began by a laborious attempt to prove that the writer knows nothing of apiculture or prophecy, but in no one instance disproving a single position or showing the author's ignorance of apiculture, but in more than one instance deploring the writer's oversight of this or that hive. Every one of these writers—plainly under the inspiration of one—assumes that because the writer did not allude to his mode of treatment, he was ignorant of bee-management. The Bee-master had no idea there was such concert among bee-keepers, or that,

in giving an account of his intercourse with his bees, he was putting his hands into hornets' nests. But wasps have been a terrible plague this autumn.

One writer in a Scotch paper, who gives bees no credit for any ordinary virtue, and regards them purely as mechanical toys, writes thus :—

"This Bee-master says that 'the bee leaves her house, traverses a mile or two distant, and returns to her home—one amid twenty contiguous ones—with unerring certainty.' This was the general opinion up till lately—that the bee always returned to its own hive—in fact, there was no means of proving the contrary until the introduction of the Ligurian variety of bee. For the information of 'A Bee-master,' I must tell him that they do not at all times go back to their own home, but make a mistake and enter their neighbour's. This fact I soon ascertained after I got the Ligurians, as in a short time I saw them going into all my other common hives, more or less, and a neighbour nearly a mile away from this found the Ligurians had joined one of his swarms when in the act of swarming. These are facts which cannot be controverted, and prove that 'A Bee-master' ought to make himself master of his subject before he attempts to teach others. Queens, too, are frequently killed by entering

into other hives when placed near each other, through their mistaking the one for the other; but these facts were not known to the generality of bee-keepers until they used the bar hives, when all the economy of the interior could be examined at pleasure."

This foolish logician introduces foreigners to an English hive. They do not act like English bees—in short, they are not acquainted with a country in which they are not acclimatised; and from the blunders of the Ligurian foreigners he infers the ignorance of the British bee. This is a specimen of the rubbish printed from Devon to Haddington.

Another position of this Scotchman with a bee in his bonnet is as follows:—

"In removing a super—that is, a top or bonnet—he says they should be taken one hundred yards away from the hive, and the bees will fly back to the hive in about an hour. This I think a very bad plan. In the first place, if taken off in a fine day the bees would not leave it in an hour, and if there were any bees near, they would find it out in that time, their scent or sense of smell being so strong, and he would never get them away; and, besides, he would be very apt to take the queen

away also, she being often found in the top, and she might not be able to fly back. It is certainly a bad plan in this part of the country, especially when the weather is cold in the autumn. When removing the heather honey, blow a few puffs of smoke from a burning rag into a super, and take it off, turning it upside down, putting on it another empty super of the same size, with cloth wrapped round where they meet, to keep out light. Next give the super containing the honey and the bees a few taps with a piece of stick at intervals. The bees, when filled with honey, which they will do as soon as disturbed, will ascend into the empty super, and if the queen should be there she will lead them at once, and they can all be put back into the hive. Any top can be emptied of bees in fifteen minutes by doing it in this way, and without running risk of losing the queen."

Now, in ninety-nine cases in a hundred the queen is not in the super, and an intelligent bee-master can take care she is not there before he removes the super; and, in the next place, *The Times* Bee-master expressly stated his entire aversion to smoking bees for such a purpose; and earlier than August there is no risk of corsair bees.

Besides, preference of one plan to another is not necessarily proof of ignorance.

This mere copyist of Devon remarks:—

"What can be the necessity for subjecting sugar to the temperature of 300 degrees, and rendering it so hard that weak hives are not able to take as much as keep them alive, when the same amount of sugar made to the consistency of their natural food would enable them to live? Common sense would indicate to anyone that in artificial feeding the nearer we approach their natural food the better; but it may be that it is hard honey which this wiseacre's bees gather for him, and that the flowers in Kent give different food than those in Scotland! Let anyone observe the time a bee takes to fill itself on barley-sugar and the time from sugar syrup, and the labour spent on the former to that of the latter, and he will soon see the difference between the two. And the only reason the writer gave, in answer to a correspondent, for giving the barley-sugar is, 'that the other clogged the feet and smeared the wings of the bees.' Now, everyone must be aware that a few straws in the dish prevents this. Again, he says that 'the only vice among bees is their passionate liking for rum and strong ale; but the tee-totallers would fairly reply that they never care about

either unless it is pressed upon them.' And I say they would reply truly, for I maintain that the bees will not touch either rum or ale unless they are saturated with sugar or honey. But why be at the expense of the one or the other, when they will take it made with pure water before either?"

He must be in the habit of bolting his oatmeal pottage, or he never would have inferred that sipping its food in ten minutes is more conducive to the health and digestion of the bee than sipping it in half an hour. His remarks on ale and rum are merely a translation of the nonsense spoken by his original. But, in common with his co-partners in criticism, he thinks the Bee-master's sole design in writing the letters in *The Times* was to puff his forthcoming work on bees. This mean and contemptible charge is best met by the simple and truthful answer, that the Bee-master had no more idea of writing a book on bees than of describing Mount Radnor or Yester Gardens. His purpose to do so arose from the urgent request of literally hundreds of correspondents.

On my suggestion as to the purpose and object of two thousand drones or male bees being produced, when there is only one perfect female—the queen—the writer observes:—

"In one of his letters in answer to correspondents, 'Why there are so many drones in a hive, and only one princess?' he confesses it a hard problem. But one part seems to him very clear—'When the queen's countless eggs come to be hatched, the temperature of the hive must be raised to 85° or 95°. The fat, round, and lazy drones are really the fuel. They accordingly give out great heat.' Had the writer really known anything about bees, he could never have made such a statement. If the drones are the fuel to keep up the heat, why is it that they are never found in the hives till May or June—in this part of the country, at least—after thousands of bees have been hatched? If they were the fuel, surely one would expect them to be the first eggs which were laid by the queen, according to his theory; but a queen will begin laying workers' eggs in January, and yet lay no drone eggs till May, just when the warm weather commences. Now, if they were required for heat, naturally we would expect them to be found before May, and they commence killing them in August, when the cold weather begins."

Now, the fact is, it is in May and June that drones are wanted to keep up the heat. Half the bees are out at work, the means of maintaining the temperature are therefore diminished. The drones remain at home, unless during the noonday heat, when they take an airing, and can best be spared.

My first letter to *The Times* was a report of the prospects of the honey harvest, as follows:—

I have ten stock-hives. I never destroy or kill my bees. I look on the system of the sulphur match as barbarous and unprofitable. I leave each family on an average not less than twenty-five pounds of honey for their winter stores, and the surplus only I take away. Should any hive swarm, which I can generally prevent, and the remaining stock be therefore deficient in provision for the winter, I feed them in the course of the early spring with barley-sugar. This and other little attentions endear the bee-master to his bees, as they are very susceptible of gratitude and have long memories.

A hive is very like a church: when, in May, it increases rapidly in numbers and the temperature rises inside, you either increase their accommodation in area or in height, or you will have a secession. Should a secession take place, bees set an example ecclesiastics might copy. The new church never falls out with the old one. Side by side they work in perfect harmony, believing there is plenty of food for both. The only incidental mischief-maker is the wasp; whether he be prelate or presbyter I cannot say, but I know well he is a thief and intruder, and after a fight, the bees, who in this matter are rigid non-intrusionists, eject, maim, or kill him—and he deserves it. Queen Victoria's Court is modelled on the apiarian queen's. You may see the queen bee, by means of my glass windows, going her rounds and giving orders, with her royal ladies, who never turn their backs on her majesty. The exceptional instance occurred on one occasion when it became necessary to give a rather sickly establishment rum and sugar, of which they drank to excess and got drunk. As long as the stimulus lasted, the monarchy became a fierce democracy, and queen and subjects were confounded in the *mêlée*.

The only vice among bees is their passionate liking for rum and strong ale. But the teetotaller would fairly

reply, that they never care about either unless it is pressed upon them.

My bees at present have begun the massacre of the drones. These are a sort of Benedictine monks, who, like Brother Ignatius, prefer enjoyment to hard work. They are round, fat, and lazy, making much noise, and eating of stores to which they do not contribute. . . . . But you want to hear about the harvest?

In one square box there are forty pounds of honey, and in a corresponding super rapidly filling up, there is likely to be for me as much more.

In three Scotch or Ayrshire octagonal hives, which I have found to answer best of any, the three supers are in two almost full; and in one there is at least forty pounds weight in the super, and over the super is a bell-glass with seven or eight pounds additional.

In one of Neighbours' very beautiful straw hives I have two bell-glasses almost full, and a month ago I removed from this hive a very beautiful glass of honey.

In one of Pettitt's lateral hives, the bees passed through the subterranean archway a month ago, and have nearly filled this compartment. On this, also, I have placed a super bell-glass, which is beautifully stored.

From a common cottage straw hive I removed a bell-glass super three weeks ago weighing eighteen pounds.

This season I shall have nearly two hundred pounds weight of surplus honey, and yet leave in each hive more than enough to last the producers till April, 1865. Why should not cottagers cultivate bees? There is nothing to pay for pasture, very little labour is required, and that labour amusing, in taking care of them, and for very early virgin honey there may be had one shilling and sixpence or two shillings and sixpence a pound. The poor cottager might thus easily pay his rent. If landlords could only convince them that the old system of burning the bees in order to get the stock honey —which is at best inferior—is not only cruel but unprofitable, they would do an essential service. The poor peasant would have an interesting amusement after his day's work, and a contribution towards his rent on the year's end.

BEES AND BEE-HIVES.

To the Editor of "The Times."

SIR,—Since my letter appeared in your columns on "the Honey Harvest," I have received from yourself various communications from rectors, vicars, curates, &c., who feel a very great interest in bee-keeping as a social

and commercial question. I have also received letters addressed to me as "*The Times* Bee-master," which the postman, guided by some remarkable instinct, has placed in my hands. Most of these letters invite confidential and personal communication on this subject, and record a variety of questions, difficulties, and perplexities which have injured or arrested the apiarian enterprises of the writers. I prefer to answer some of their inquiries through your columns, believing that the interest and importance of all that tends to benefit the cottager will ever find a place or a defence in *The Times*. The most urgent questions in the letters of my correspondents refer to the hives I employ, and which I briefly described in my letter. The first I mentioned is the Scotch or Ayrshire octagonal hive. It is made of thoroughly seasoned deal, in the form of a hexagon, about eight inches in height, and sixteen inches diameter. On the top is a series of parallel slits, extending from front to back, which I open or shut by a series of corresponding deal slides. On receiving a swarm in April or May, I introduce the slides, and thereby close up the top of the box. On finding—as in fine weather I am sure to find in three or four weeks—that the box is full, I place on the top another hexagonal box, in all respects the same in size and shape, and draw out the slides, and thereby introduce the bees

to the vacant upper chamber. As each box has a window, I am thus able to ascertain progress. When this upper box is filled with honey, I may place on the top of it another precisely the same, drawing out the slides on the top of the second box, and introducing the bees to a third story. But usually I prefer, for the sake of the beauty of it, a bell-glass, greater or less as the season may suggest. I have found this hive by far the most successful. It seems the bees, who construct their cells in the form of hexagons, prefer the house in which they work to be very much of the same shape. A cottager may very easily make these boxes in the long winter evenings.

The second kind of hive I alluded to is made of straw, and may be purchased at Neighbours', in Holborn. The greatest disadvantage is its expense, costing, as it does, thirty shillings. But it is so well made that it will last very long. I have had one in constant use during ten years, and it is still as good as when it was bought. Its top is flat, with three longitudinal apertures, closed till full with zinc slides. About the end of May, in a good year, I draw out the slides, after placing over each a good-sized bell-glass; and in July I have often had in each glass seven or eight pounds of honey. The reason of the failure of this hive is the coldness of the glass, which Neighbours' additional super straw hive or cover

does not mend. But if my correspondents will get a piece of thick Scotch plaid made like a nightcap, and case each glass with this, they will find the bees use it as readily as a wood or straw hive, and there will be no moisture from condensation of the bees' breath inside.

The third sort of hive is Pettitt's, of Snargate, Dover. It is worked on the lateral system, and of its kind is a perfect gem. Two boxes are placed on one floor, with a subterranean communication between them. On stocking the box on the right, a zinc slide is introduced, which shuts off the communication. As soon as the box is full, the slide is withdrawn and the communication laid open. The bees take possession of the other box on the left, and fill it with pure honey. When my harvest comes, I shut off the communication, and remove the left-hand box full of honey. You will perceive that my principle of action proceeds on the notion that the bottom box of the Ayrshire or Scotch hive, the straw box of Neighbours', and the right-hand box of Pettitt's, are each the sacred property of my bees, which I feel it larceny to lessen or disturb, and that the surplus is the tithe or portion of the bee-master. The ruinous blunder of country bee-keepers is their taking honey from the former—honey, too, mixed with brood and bees' bread and the films of the young grubs. In this, the department I

never touch, the queen presides with her ladies-in-waiting; and in any one of these, if the bees have filled the additional supers or laterals, there is abundance for all her subjects during the winter.

In some of the letters you have been good enough to send me, the expense of these hives is urged as a fatal objection as far as the cottager is concerned. Let me therefore explain my last and cheapest plan — not best, but cheapest.

Place the swarm in a common shilling straw hive. When you ascertain, either by its weight or the busy working of the bees, that it is full, take a square board, about a foot square; cut in the centre of it a round hole three or four inches in diameter; place on it a bell-glass, or what is cheaper, a smaller straw hive. Take a sharp table-knife, and go to the hive about twelve o'clock at noon, when most of the bees are out working; cut out the top of the straw hive, making a round aperture of four or five inches in diameter, and place on it the board with the bell-glass, or lesser straw super, covering the glass with its nightcap, and you have everything you can desire. If, in cutting the hole on the top of the stock hive, you hesitate or lose your self-possession, the watcher bees will attack you. Decision invariably paralyses them for the moment, and secures your

safety. These glasses or supers are removed by cutting through between the board and the lower edge of the super with a zinc plate, on which you carry off the super full of surplus honey, placing over the hole at the top of the stock a flat board or an empty super. From one straw hive treated in this way I carried off eighteen pounds of honey at the beginning of July this year. I ought to add, that I keep my hives of every sort under cover of wooden sheds, accessible from behind by means of doors that let down. During the winter, I cover up the hives in the sheds each with paper, and thereby I keep them warm. As the spring approaches, I give the lightest an occasional half-pound of barley-sugar. This barley-sugar I get at Kilner's, in Hanway-street, Oxford-street, before it is mixed with scent or lemon-acid. Common sugar is of no use. To be available to the bee, to suit a lambent insect, it must have been exposed to a heat of 300° Fahrenheit, in order to reduce crystallisable to uncrystallisable sugar. As I am answering your and my correspondents, I had better add a few useful hints.

Get acquainted with your bees; they are naturally very affectionate. I have frequently hived swarms, filling each hand with clusters of bees, and rarely have I received a sting. I have sat in the midst of them for hours, and

weary bees have rested on me, and have entered their homes singing a song of thanks.

They have several bitter enemies besides the wasp. I used to see toads frequently sitting under the landing-board, and only recently discovered they were there "seeking whom they could devour." On one of these ugly visitors being laid open, his maw was found filled with bees which he had sucked into his ugly jaws. The tom-tit, also, is a dangerous little enemy. He perches on the landing-place of the bees on a wet day, taps with his bill, apparently inquiring after the health of the inmates; a watcher bee comes out to reconnoitre, and is instantly snapped up by the wicked hypocrite. The spider, also, catches weary bees in his web; but the occasional use of a brush disposes of this peril. The snail, attracted by the warmth, occasionally creeps in. The bees successively attack him, but find their stings blunted and broken by the shell, as shot is by our ironsides. Failing to injure or remove the intruder, they have recourse to a plan which indicates more than instinct. They cover him up with propolis, a kind of gum which they use for stopping up crevices; and not only does he die from want of air, but he is prevented from giving forth offensive odour by the air-tight case or shroud.

The most attentive bee-master occasionally gets stung. I have discovered a cure not found in the pharmacopœia. Press a watch-key hard on the place after removing the sting — this prevents the poison from spreading; then apply moist snuff or tobacco, rubbing it well in, and in five minutes all pain is gone. This is a never-failing remedy.

I have entered into these details, because from the correspondence you have sent me, and from letters that have reached me, it is evident that a great interest has been excited by my communication, and because it is of great social importance. Many a poor curate and ill-paid vicar, and many a cottager with time to spare and his rent to pay, may thus add to their income. My bees feed over an area of six miles, improving every flower they touch, and robbing nobody. Tunbridge Wells is one of the best bee-districts in England, and this alone is evidence of its being a healthy district. Bees never get on in unhealthy places.

Apologising for this long communication, I am, &c.,

A BEE-MASTER.

Tunbridge Wells, July 27.

Bees and Bee-hives.

To the Editor of "The Times."

Sir,—The letters that reach me addressed to "*The Times* Bee-master" are legion. I can now form some idea of the weight of the load that must press on your shoulders every day; but I confess I had no notion of the extent of the interest that these letters prove to exist in apiarian culture. I select such difficulties from the letters before me as I have not disposed of, and these I would endeavour to overcome.

A very often repeated question is—What is the best way of hiving bees or securing a swarm? Let me at once state that the old and inveterate habit in Kent of beating a kettle, striking the tongs with the poker, and raising similar discordant sounds, is utterly absurd. They do not affect the bees. In swarming, the old queen abdicates and heads the swarm, and a young queen mounts the throne in the hive. The outgoing queen, followed by five thousand or six thousand bees, either *ex proprio motu*, or guided by pioneer scouts, selects a rose-bush, or a cozy opening in a laurel-hedge, and all her subjects hang on, forming a cluster of bees as large as the largest bunch of grapes. As soon as they have nearly all settled, take

your empty hive or bee-box, which must be thoroughly clean, as bees hate dirt and slovenliness; turn the hive or box bottom upwards, hold it in your left hand under the cluster of bees, lay hold of the branch on which the bees hang with your right hand, and shake down the swarm into your empty hive. Place the hive bottom downward on a bee-board laid on the grass close by, raise up the edge by inserting a wedge or stone about two inches in size, and cover the top of the hive with a cloth or a few branches to keep off the sun heat. If the queen is inside, which is usually the case, the bees will steadily enter and remain. If by your awkwardness you have left her in the hedge with her ladies-in-waiting, the bees will return to the hedge, and you will have all to begin anew. As soon as they are comfortably housed, carry the hive to the shed under which it is to stand, and do not look at it or touch it for three days.

You need not be afraid of stings unless you rudely and violently meddle with the queen. If you thus interfere with her, the watcher bees will sound the alarm, and a thousand stings, like swords, will be unsheathed; but, otherwise, they are so absorbed with her majesty that they do not fly at a prudent and fearless bee-master.

A very important inquiry, repeated in several letters, is, on removing the super, whether of glass or straw, how are

the bees to be expelled, that the honey alone may thus be secured?

All the plans of tapping, beating, and smoking are bad. Tobacco-smoke, and smokers generally, bees have a mortal hatred to. Bees have other personal antipathies, but the horrid scent of a tobacco-pipe in a visitor's pocket either induces them disdainfully to shun all acquaintance, or provokes them to make an attack.

Your best way of removing a super full of honey, with bees, of course, in the spaces not full of comb, is to carry it about one hundred yards away from the hive. Wedge up the glass on one side from the zinc plate on which you have carried it, and the bees will leave in the course of an hour or two, and fly home. They very soon discover their separation from their queen, and under this feeling they lose all courage, and give up defending the very property they would have died fighting for when connected with the parent hive. The exceptional case is where there may be, what is very rare in a super, a portion of young brood—always in such cases drone-brood. This they refuse to desert. They do not attack, but, as if placed sentries by their queen, they insist on continuing at their post. The only course in such a case is to cut out the brood cells and put them away, as they are not likely to be wanted, and the bees will then return to the stock

hive, report, I suppose, and receive future orders. In removing a super in August, when the bee ceases to accumulate in Kent, you must take care not to do so on the windward side of your hives, as the scent of honey will bring your visitors from every hive, who will rob you of all.

If in this month you find it difficult to escape the robbers, carry your super into your cottage, near a window, and expose one side of the super to the window—the side having egress for the bees. Very soon great numbers will fly to the window-panes, and by opening it for a few minutes they will rush out, and robber bees will have no time to enter.

I have been asked—Who and what is the queen, and who are those lazy abbots I referred to as drones? The queen is nearly twice the length of the common bee, of elegant proportions and shape. On seeing her, you would at once pronounce her a duchess or a queen. But it is a singular fact, and well worthy the consideration of sanitary students, that she rises originally from the ranks, and that treatment makes all the difference. The egg deposited seems the same as that of the ordinary bee, but we find it always laid in a cell three times the size of common cells. As soon as the young queen comes from the egg, numbers of nurse bees wait on her; she receives finer and more

delicate food, more air, a warmer, larger, and nicer house, and apparently she is the creation of circumstances. She is the only female bee. The working-bees are neuters, really imperfectly developed females; the queen's husband is a drone. With queenly prerogative and dignity she selects her consort, and off they fly on a wedding-trip, and spend the honeymoon amid sunshine and flowers. But it is asked—Why are there so many drones in a hive, if there is only one wife? This is a very hard problem. But one part of it seems to me very clear. When the queen's countless eggs come to be hatched, the temperature of the hive must be raised to 85° or 90° Fahrenheit. The bees must go out of doors to work. The fat, round, and lazy drones are really the fuel. They accordingly give out heat when most wanted. Mr. Cotton holds this view also. This year I had two stock hives during breeding that stood, from 10 to 4 o'clock, at 95° Fahrenheit. We thus learn that fat old gentlemen are of use, and that Mr. Banting's system is not always wise or expedient.

There are in a good hive three or four royal cells; consequently, three or four queens will turn up. What follows? If the heat be great and additional room withheld, the old queen will abdicate and head a secession—in apiarian language, a swarm—and the next senior queen will ascend the throne. If there be still no increase of

room allowed, she, too, will sècede and head a second secession—in apiarian phrase, a caste—usually feeble, requiring when hived to be fed, and rarely a desirable issue. But when increased space is given, and a drawing-room is added to the dining-room, and boudoirs to the nursery, I am asked what follows. Do the princesses live together in harmony? My answer, from very careful observation, reveals a sad fact—a fact I cannot suppose to have been instituted in Paradise. If two queens turn up in a hive with plenty of space, but related space, they fight it out till one alone lives. So settled is this law, that the bees hound on the more timid and cowardly of the two queens, and insist on victory with supremacy or death. This is to me a very melancholy trait in a favourite study; but I suppose some higher law requires it.

It has been urged as a commercial question that honey is not now of the same importance as it was before the sugar-cane was discovered, and that gas has superseded wax candles. I am satisfied from many considerations, that if people would eat honey at breakfast instead of rancid London butter and nasty greasy bacon, not only would their health be better, but their temper would be sweeter. I find invariably that people who like honey are persons of genial and affectionate temper. If Mr. Cobden and Mr. Roebuck had only taken honey at

breakfast, or a very choice fragment of virgin honey at dessert, they would never have given utterance to those vinegar and acetic-acid speeches which did them no credit. I wish somebody would send Mr. Spurgeon a super of good honey. Three months' diet on this celestial food would induce him to give up those shockingly bitter and unchristian tirades he has been lately making against the clergy of the Church of England. The producers of honey never draw their stings unless in defence of their homesteads, and the eaters and admirers of honey rarely indulge in acrimonious language. I believe a great deal of bad feeling is not moral or mental, but physical, in its origin. If you have in a congregation, or in a school, or in a convocation, some one who sets everybody by the ears, treat him to a little honey at breakfast for six months, and the "thorn will blossom as the rose." People that can't eat honey—"*hunc tu caveto*"—they can't ever fit "a land overflowing with milk and honey."

I have not answered half the letters I have received; but because you have been so good as to take an interest in this very interesting subject, I intend to send you, as an expression of my thanks, a small glass super of honey filled from heath during July. If you do not eat honey, which I hope and, indeed, am sure is not the fact, you

can give a portion to any inmates of your great hive in Printing-house-square who may be prone to use their stings too freely.

I am, Sir, your obedient servant,

A BEE-MASTER.

Tunbridge Wells, August 2.

The origin of the following letter was a very foolish letter which a correspondent sent to *The Times*. His cannot be the deliberate conviction of anyone acquainted with bees. Perhaps he was offended that no notice was taken of a very unsatisfactory hive patented by him. But as I could not praise, I thought it unnecessary to blame.

A HORNET AMONG THE BEES.

To the Editor of The Times.

SIR,—It is well that bees have not learnt to read *The Times*. Did they see all that your correspondent says about them, they would send a battalion to his residence, and ere they returned to Tunbridge Wells they would make their calumniator exhaust all his remedies for bee-stings. Had this good gentleman eaten more honey and

drank less vinegar he would have written a more affectionate letter; and had he watched the habits of bees as I have done, or studied the results of the investigations of Huber, he would not surely have written with ignorance so crass. I am not irritated with him, but I am immensely jealous for the honour and good name of my bees. It is said of some crotchety people, "they have each a bee in his bonnet," but I venture to think of your correspondent, "he has a wasp in his bonnet." The only philosophical way by which I can account for the absurdities of this letter is that it was written, as he observes, "for our continental and transatlantic brethren," neither of whom have any precedent or encouragement for recent Austro-Prussian misdeeds, or American democracy and its recent excesses, in the habits and instincts of bees.

"First," says your correspondent, "with regard to remaining at peace with each other, as soon as honey-gathering is over, should any stocks betray weakness, the war of Germany against Denmark is enacted, and the invaders take all. Whatever virtues bees possess, honesty or even the slightest respect for *meum et tuum* is not among them."

A grosser libel on the apiarian race was never perpetrated. Their respect for *meum* is so intense that they will defend their queen and home to the death. Their

respect for *tuum* is so entire that they never touch the property of their neighbours, unless in circumstances which would justify men as well as bees in seizing the property of another.

Your correspondent perhaps robs one of his stocks of its stores, or takes away for the market or his table too much of their accumulated wealth. Winter threatens its arrival. Can this irritable old apiarian expect that 6,000 or 10,000 bees will lie down and die martyr deaths in order to confute his libellous theory of *meum et tuum*? Or he has neglected to feed a caste of 4,000 bees; or, instead of giving them barley-sugar, he offers them the miserly mess he recommends, and the unhappy, famished bees, like a Highland clan, set out "to lift" the means of existence. He starves his bees, and when they forage he denounces them as thieves. If a bee-master does his duty by protecting his hives, feeding the unfortunate and weak, no such freebooters will be found among his bees.

2. Your correspondent, for once, is gracious. He acquits bees of habits of intoxication. He forgets that I stated they never get drunk unless the bee-master supplies the intoxicating element. But if he will place a feeding-pan full of good Scotch ale before the hives, I will eat pan and beer and bees if they do not sip every drop, and give very unmistakable proofs that they have done so.

3. Your correspondent says: "Mr. Harbeson, a sturdy citizen of the American Republic, considers the queen a simple machine for laying eggs, absolutely under the workers' control. I do not go these lengths, but Mr. Harbeson is far nearer the truth than your correspondent."

There can be no doubt that this "is written for our transatlantic brethren." It is a fine illustration for Abraham Lincoln. I hope your correspondent will not be offended if I suspect in him a machine for speaking nonsense. He has only to extend this free philosophy, to see in rose-bushes machines for growing roses, and in birds machines for building nests; in Tennyson a machine for spinning poetry, and in Lord Palmerston a machine for turning out speeches. This wretched materialistic philosophy may please the "sturdy American citizens and transatlantic brethren;" but how a sane Englishman can dare to ventilate such arrant rubbish, I know not.

His exaggerated talk about bees being regicides would electrify Red Republicans, but it is not true. That the queen, who has precedence of birth, destroys the princess next to her that might be her rival, I admitted and deplored in my letters as sad. But that bees are regicides is not fact. They never kill their queen; they love and are loyal to her, and obey her commands. I said they hate republicanism, and so they do, and so do I. No

doubt your correspondent's discoveries will charm his transatlantic brethren. But if ever a people were in want of a queen, they are. Your correspondent may like Abraham Lincoln; I infinitely prefer Queen Victoria. He says cottagers cannot make Ayrshire hives. They do cleverer things. At all events, they can try. The Ayrshire hive is octagonal, I admit; but all I said was, that my success as a bee-master led me to suspect they prefer a box similar to their combs, and therefore I intend this winter to have several hexagonal bee-hives. A suspicion of preference was all I ventured to state.

Your correspondent says: "Common sugar (lump-sugar is best) does not require to be exposed to a heat of 300° to be available to bees." No wonder his weak stocks plunder his strong ones, for bees cannot eat and do not eat lump-sugar or brown sugar. Their lambent organisation renders it impossible. I spoke of feeding with pure sugar, and stated that it is available alone in the shape of barley-sugar only. That it can be presented boiled up in beer or water, I taught when I alluded to its being dissolved in ale. But whether in water or ale, it smears their wings, clogs their feet, and is vastly inferior in all respects to barley-sugar.

Your correspondent objects to rubbing the wound of a bee's sting with tobacco-juice. I speak from experience.

I have tried every prescription, and most assuredly I will not try his. He says :—

"If anyone has a swarm consisting of only 5,000 or 6,000 bees, let him not take the trouble of hiving it. A good swarm will weigh 4lbs., and I have known one weigh 8lbs. Now, 5,000 bees are computed to go to a pound, and this is not too many, for a friend of mine counted and weighed 5,020 freshly-killed bees this spring, and they only weighed 12½ ounces. Let any one, therefore, do a simple sum in mental arithmetic, and say if 15,000 to 30,000 are not within the mark, even allowing for the weight of honey carried off by the swarm."

I mentioned 5,000 or 6,000 bees as a swarm. It is the lowest, I freely allow. But I will add to your correspondent's knowledge. I had a caste thrown off last year, at the end of June. I despaired of its weathering the winter, but I resolved to feed it richly with barley-sugar till March. The maximum number of bees was 5,000. It had filled the lower box with at least 40lbs. of honey by the middle of June this year. The bees had increased immensely. I opened the communication with a large super. This super has in it now not less than 26lbs. of the whitest cells and honey I ever saw. I have shown it to many whose mouths watered for a slice of it. I never join stocks. We feed cattle on oil-cake : why not feed

weakly stocks with barley-sugar? What your correspondent proposes as his explanation of 2,000 drones in a hive where there is only one queen, with, perhaps, a couple of princesses, is, like his whole philosophy, very absurd, and unworthy of a serious answer.

Your correspondent says:—

"Bees are never nursed by other bees. They are strict utilitarians, and totally devoid of sympathy. 'Those who cannot work shall not eat,' is a law applied with stern impartiality alike to the disabled worker and the useless drone. He, therefore, who would teach or learn a lesson in charity must look elsewhere."

My reply to this is, I have seen the disabled bee tended with exquisite and unwearied attention, rolled in the sunshine on the bee-board, and carried or helped into their homes. His testimony is negative, mine is positive.

He concludes his letter by informing us—

"As it is, I am very desirous of making it known to our continental and American friends that these letters [in *The Times*] do not convey an adequate idea of the amount of knowledge of the subject possessed by British bee-masters."

His letter, he reiterates, was written for the American market. I only hope they will not suppose that his crotchets are the measure of the amount of knowledge possessed or of the affection felt by English bee-masters.

If in his next he will mix a little honey with his ink, and eat a little at breakfast, he will do greater justice to himself.

I am, &c.,

A BEE-MASTER.

Tunbridge Wells.

BEES, BEE-HIVES, AND BEE-MASTERS.

To the Editor of "The Times."

Sir,—I have been so annoyed at your correspondent's attack on the good name of my bees, that I cannot resist the temptation of saying a word or two of additional defence.

That the queen is not a mere egg-laying machine obedient to mere mechanical impulses, nor her subjects mere mechanical creations obeying similar impulses with no instructive appreciation, will be evident from the following facts:—

Reaumur, the eminent naturalist, observes that after the queen-regnant has become a mother—

"The bees are constantly on the watch to make themselves useful to her and to render her every kind office. They are for ever offering her honey. They lick her with

the proboscis, and wherever she goes they form a court to attend her. Even the body of a dead queen is the object of tender affection to the bees. I took a queen out of the water seemingly dead. She was also mutilated, having lost a leg. Bringing her home, I placed her amid a number of working bees recovered from drowning also by means of warmth. No sooner did the revived workers perceive the queen in her miserable plight, than they appeared to compassionate her, and continued to lick her with their tongues until she showed signs of returning vitality, when they set up a general hum as of joy at the event."

Huber writes :—

"I have seen the workers lavish the most tender care on such a queen, and, after her decease, surround her inanimate body with the same respect and homage as they had paid to her while living, and in the presence of these beloved remains refuse all attention to young and fertile queens who were offered to them."

These are two facts noticed and recorded by the two most eminent and careful apiarian naturalists. They are, in the judgment of everyone able to appreciate weight of evidence, conclusive disproofs of the material and mechanical theory, and no less decisive confirmations of all I ventured to state in your columns.

The senses of the bee are no less clear protests against the mechanical theory so acceptable to "our transatlantic brethren."

The bee leaves her house, traverses fields a mile or two distant, and returns to her home—one amid twenty contiguous ones—with unerring certainty.

The sense of touch through its antennæ is so exquisite, that in total darkness it carries on its architecture as perfectly as by day.

Its smell is possessed of unrivalled sensibility. Odours from afar are directly scented. Huber thinks it is the scent, not the colour of flowers, that attracts them.

Their power of memory is illustrated by Huber. He placed a supply of honey on the sill of an open window in autumn. The bees feasted on it for weeks. He removed the honey and closed the window during winter. Next spring the bees came to the same window, looking for supplies. Here was memory of place and circumstances lasting during half a bee's lifetime.

Huber mentions a species of moth that attacks and plunders bee-hives; it is called the death's-head moth. Finding out its daring depredations, he lessened the apertures of some of his hives, leaving sufficient room for the exit and entrance of the bees, but not for the entrance of the moth. This succeeded perfectly. But several

hives he left undefended. In each of these undefended hives the bees raised a wall of wax and propolis right behind their doors of entrance, making embrasures for exit and entrances through the solid wall. As soon as spring arrived and all danger was at an end, these Royal Engineers threw down their fortifications.

I need not refer to the perfect and well-known geometrical construction of the cells of a hive as evidences of design and high instinct; they combine the maximum of strength with the least expenditure of substance and the largest capacity in a given space. The equilateral triangle, the square, and the hexagon, were the only three forms of tubular cells that would leave no interstices: in the first there would be lost space in each angle; a similar disadvantage would be found in the second. The bees, by an instinct surely Divine, or in the exercise of engineering powers demonstrative of mind, have adopted the last.

Having thus disposed of your correspondent, will you allow me to select one or two of the most important practical inquiries which I have received in upwards of twenty additional letters addressed to "*The Times* Bee-master?" Your universal circulation is the cause of my extraordinary visitation of correspondence, and this unexpectedly-wide practical interest in bees will justify you to

your readers. One asks, "How am I to begin an apiary?" Let me tell him. Buy a stock this month or next for 20*s.*, taking care that it is not old, and weighs (inclusive of straw hive) not less than 30 lbs. Erect a shed with sloping roof projecting sufficiently to carry the rain beyond the alighting-board of the bees. The length may be 12 feet, the height about 6 feet, and width 2½ feet. Divide it into six equal sections or chambers. Make an exit in each, three inches long by two inches high. Place each hive in the centre of one of them, with its opening directly opposite the opening in the chamber. Fix below each opening in the shed a bees' landing-board sloping at an angle of 25°. If you can afford it, buy six stock hives. Next May cut out the top of each, as I directed in a previous letter. Place on it a board with circular hole, and a bell-glass rather narrower at the lower part than at the centre; cover each with its plaid nightcap, and you will have plenty of delicious honey in 1865.

If, however, you do not mind loss of time, build your shed this autumn, make it smooth inside to discourage spiders, and next April send round the country to cottagers keeping bees, and engage six good swarms, which ought not to cost more than 10*s.* each. In carrying them home, pin over the entrance-hole a piece of gauze, tie a towel or napkin underneath, fastening the four corners at

the top, and do not jolt the young family unnecessarily. If the swarms can be had in May, and if it prove a fine summer, you may place a glass on each about the end of June. Do not forget the old adage—

> "A swarm in May
> Is worth a load of hay;
> A swarm in June
> Is worth a silver spoon;
> A swarm in July
> Is worth a fly."

If your swarm is an early June one, you may save it by pushing three or four sticks of barley-sugar into the hive by the exit aperture once a fortnight till next March. Any little expense in feeding introduces you to your bees and helps them wonderfully, and is never a loss.

If you want to tempt the bees to feed in your own garden, sow mignonette, salvia, and sanfoin; plant plenty of raspberry, gooseberry, and currant bushes. They like lime poplars, apple-blossoms, thyme, and, above all, borage. Bees never touch double flowers. Should the early summer prove very dry, place near your bee-shed two or three soup-plates half full of water, taking care to put in as many pebbles as each will hold. The bees require stepping-stones for their tiny feet, and otherwise they are necessary to save them from drowning.

I am giving directions to those who desire to work economically. But if you can lay out a little as an investment, and you desire to combine interest and pleasure with profit, you cannot do better than call on Neighbour, either in Regent-street or Holborn, where I have seen many varieties of hives of different prices and all of good workmanship. In answer to numerous inquiries about the Ayrshire hives, I am sorry to be obliged to answer that I have to send to Scotland for them. They may be had of Mr. Bruce Taylor, Post-office, Manchlin, Ayrshire; or of Messrs. Craig, Stewarton, Ayrshire. The three boxes in the lower or stock hive, with two supers exactly corresponding, cost me 20*s*. But they last for ever. Their chief value is their productiveness. Neighbours' and Pettitt's are far more interesting for experimental uses. The collateral system is the most elegant, but least productive; its bee-boxes are also expensive. Your correspondent's hive (which I ought previously to have referred to) is no improvement, and its architect has so bad an opinion of the moral character of bees, that were they to know it was his, they would desert it. There are people to whom bees never take, and there are hives they invariably sicken in. I do not like the nadir system recommended in *The Times* by "A Rector." Bees naturally ascend or traverse the same plane, but mostly preferring ascent. "Excelsior" is

their favourite aspiration. In answer to another inquiry, do I approve using stupifying fumes, as of puff-ball, &c., in order to expel the bees from supers full of honey?—I say, certainly not. It may not injure the bees if judiciously administered. Some highly recommend it. But it is not necessary. The bees will leave the super on its being detached from the hive and carried to a little distance, and will return in an hour or two to their home and their queen. The only case in which I have recourse to fumigation is when any portion of the comb, through accidental admission of wet, has become mouldy. A few whiffs of puff-ball may be injected, by means of an instrument sold for this purpose, during five minutes. As soon as the humming noise ceases, lift the hive and cut out the mouldy portion of the comb, replace it, and in twenty minutes the bees will again be at work. This is the only case in which I like to employ either this or tobacco-smoke, which answers as well if not too long continued.

Your apiary or bee-shed should be placed as near your dwelling as possible, sheltered from the north and north-east winds, and at the greatest possible distance from poultry. Frequently, but quietly and unobtrusively, visit your bees, watch them at work in your bee-glasses, or by windows in your bee-boxes. Let your children play be-

side them. They are fond of children, and unless violently irritated they will not injure them. I can state this from very ample experience. At the same time, it is proper to state, that some few persons are so offensive to bees that they must not approach them. Plenty of soap and water and fastidious cleanliness are essential to a bee-master's continued popularity with his apiarian family.

I am, &c.,

A BEE-MASTER.

Tunbridge Wells.

ABOUT WASPS.

To the Editor of "The Times."

SIR,—There is no sweet without a bitter. Every bee-master feels the plague of wasps this autumn of 1864; for fifteen years, the range of my experience as a bee-master, I have not seen so fierce and multitudinous bands of wasps descending on my bees on predatory incursions. I do not mean to insinuate that the wasp has no mission. I believe he has his use. He is the scavenger of our gardens, and clears off decay, putrescence, and filth of every sort. For this I give him credit, but I cannot extend to

him either the affection or respect I feel for my bees. Wasps often remind me of a class of critics not found in Printing-house-square, but by no means rare in other quarters. Like wasps, they ignore or pass by ripe, fragrant, and beautiful fruit, and select and gloat over incidental decay. The wasp-critic does not touch a beautiful thought in Tennyson or Longfellow; he can neither appreciate nor digest it. But if he can only discover a word misspelt or a word misprinted, or the word "octagon" accidentally used for "hexagon," he buzzes about it for hours, and feeds on it with waspish delight. Should the editor of a respectable paper or periodical refuse his contribution, he flies to a congenial refuge, and there pours out what wasps have nearly a monopoly of—the venom identified with and peculiar to that insect.

There is also the wasp ecclesiastical. He contributes no sweet honey to the Church, and takes little interest in its good. But in Synods, Presbyteries, Convocations, he flies about, driving his sting sometimes into a bishop and sometimes into a presbyter. A sin in another he scents from afar. A virtue in a brother he cannot appreciate. He lives on decay. He sings while he feeds on it. It is his nutriment and his joy.

There is also the political wasp. He has no fixed principles, but, instead, he has a furious temper. He

makes great noise, and attacks everybody right and left that comes within scent, eyesight, or earshot. His delight is proportionate to the degree in which he can sting. He cares nothing about party, or side, or leader. He spurns all organisation. He revels in wrath and fierce words and keen invective, unsweetened by a grain of genial feeling, or an expression softened by the humanities and amenities of debate, and unillumined by wit or humour.

There is the wasp social. He is impersonated in the burglar. Were you to see the wasps this autumn rushing into my hives, sometimes by a sudden dash, at other times by stealth, you would instantly acknowledge in them the type of the thief and the burglar. But my bees are better prepared for the wasp's reception than London householders for thieves. He runs the gauntlet every time he enters. Through my glass observatory windows I watch the conflict. One bee, half his size, seizes him by the throat, another gives him a taste of his sting, and two or three watchers seize him by the legs and drag him out. I have hit on an admirable plan of keeping him off, well worth disclosing to every bee-master. I place at the entrance of the hive a stick of barley-sugar a couple of inches long. This brings to the entrance a dozen of bees, who thankfully feed on it. There is thus secured an

additional guard at the gates. The moment the wasp alights, the whole *posse* fly at him and drive him away. Another plan is to fill half-full a wine-bottle with beer and sugar. Incidentally a bee may look in, but the wasps, whose scent is perfect, rush in and are drowned. It is a sacred duty devolving on every bee-master to exterminate these Arabs, Bedouins, and corsairs. They lay up no stores for themselves—they do nothing for the support or enjoyment of man. They use their stings, not like bees, in self-defence, but in sheer wickedness. They are professional thieves. Like the bees of a correspondent of yours, they have no respect for *tuum*, and having no *meum*, they care nothing. Living at the expense of others, without consulting the convenience or goodwill of anybody, they richly deserve what their extermination will pay for—sulphur, gunpowder, and boiling water. Let every bee-master give sixpence to every boy who destroys a wasps'-nest.

The wasp builds its nest generally underground. Their cells are hexagonal. The house is built of paper, fabricated by this insect long before its manufacture was discovered by man. With their powerful jaws they tear off decayed wood, which they moisten with a sort of gum or glue secreted from themselves. They form this into a kind of pulp and spread it out into thin sheets, with

which they roof in and surround their cells. So far they are good paper manufacturers; but I have not heard of their paper being used in the service of man. They seem also to understand the laws of heat. Everybody knows that double windows are warmer than single ones, the atmospheric air being a good non-conductor. The wasps surround themselves with several walls of paper, leaving spaces between, and thus not only keep out the cold, but render the entrance of damp all but impossible. The combs of the wasp are built in horizontal tiers, supported by pillars. In this respect they are builders as well as papermakers. They are also admirable sappers and miners. They tunnel a covered way from their nest to the open air, and very often, instead of using a deserted mole or mouse hole, they excavate a round chamber of really fine proportions. It is truly matter of regret that so much capable talent should be prostituted to so much dishonesty. Unhappily, thieves and pickpockets are generally very clever. Yet reformatories do operate real transformations of thieves; but no plan that philanthropy has yet devised has turned a wasp into a kind, honest, and respectable member of society. He is incapable of transmutation. He is worthy of the special study of Darwin. The death penalty, I unhesitatingly affirm, is due to every wasp that enters a bee-garden.

The razing of his house, the desolation of its furniture, and the dislodgment and destruction of the whole clan, have become a sacred duty. Even the Quaker, who objects to the sentence of death on murderers, would consent to the doom of the wasp. I cannot believe there were wasps in Paradise of old. Though no prophet, nor prophet's son, I confidently predict there will be no wasps in Paradise that is to be, nor will there be waspish tempers, or passions, or propensities. Of all ugly things on earth, next to the serpent, a hornet is the ugliest, the most thievish, and the most dishonest. You can neither tame nor turn the wicked imp. He is a thief from his birth—a bee-cide by habit; feeding on corruption, and full of wickedness. If, instead of killing sparrows and blackbirds and thrushes, because they take a few currants, while they destroy slugs and vermin, and many of them regale springtide with song, the farmers would set about destroying wasps, they would find as much amusement, and do vastly more good. I have a lurking suspicion that some of those apiarians who speak against bees, and call them thieves and regicides, must have wasps, not bees, in their hives. Let me beg of these irritable gentlemen, who never cease buzzing, to examine their hives. Let me remind them that wasps are bigger and longer than bees; are surrounded with

concentric yellow circles, emit a subterranean sort of hum, neither treble, tenor, nor bass, and, after a little study on their part, may be easily distinguished from bees. Above all, let me intreat them to give up feeding on wasps' food, and, if they have no honey of their own, let me offer them half a bar, in order to elevate their taste or improve their temper.

Let me also beg all that value their lives to examine well every apple, pear, and peach they eat; for these venomous insects may be seen this year ensconced under the skin, and if admitted within the mouth they will sting the throat, and, as in several recent cases, the sufferers will die. Do not conclude I am uncharitable; I am not so. It is no charity to connive at theft and murder. I am satisfied that killing wasps is no murder. Had Peter the Hermit or Walter the Penniless lived in my garden, and witnessed these wicked vagabonds trying every hive, worrying my bees and stealing my honey, they would have preached a crusade against wasps. In one respect they are unfortunate; they have no queen, no subordination or reverence for law and order. They are genuine Red Republicans—Marats and Robespierres, and richly deserve the worst they get.

I am, Sir, your obedient servant,

Tunbridge Wells. A BEE-MASTER.

The Bee-master's Sermon.

To the Editor of "The Times."

Sir,—The object of my letters has been to open up to the cottager a means of revenue very agreeable, but very much neglected or mismanaged. I have directed your attention to bee-keeping, not as a fancy pursuit, or as an interesting entomological investigation, but as a practical and real work. Hence I have not discussed a variety of toys used as bee-hives; very pretty and very tasteful to the eye of a sentimental apiarian, but so bothering to the bees that they wish such houses were at the bottom of the sea. Simplicity of structure, directness of use, and availableness for deprivation of honey, and yet preservation of the honey-makers, ought to be the guiding law. Bees don't like to be paid too many, too obsequious, or too patronising attentions. I want, however, in this closing letter to turn my largest hive into a pulpit, and to preach a short apiarian homily to English cottagers, which I know they will read, and hope they will "mark, learn, and inwardly digest."

1. They may carry from the hive to the cottage-hearth a lesson of industry. During work the bees are so intensely absorbed in their duty, that they ignore every distracting and diverging object and interest. They have

learnt well a text their masters would do well to copy: "Not slothful in business." There is no getting on in this world of ours without hard work. It is not work and plenty of it that kills people, but worry.

2. Bees teach a lesson of loyalty. They are monarchical by conviction and in practice. They love a queen, whose sovereignty is motherhood, and whose service is perfect freedom. They detest your republics, and democracies, and radicalism in all its phases.

3. Bees are immensely attached to their homes. They are "keepers at home." No mother of a family gets on by gadding about and gossiping from house to house.

4. Bees are models of cleanliness. The care with which they remove filth of all kinds is something remarkable. They plainly believe what many Christians say, "cleanliness is nearest to godliness." The cottager cannot in this matter do better than follow the example of these admirable sanitary philosophers.

5. Bees set a beautiful example of Christian sympathy. I have seen a wounded bee, accidentally hurt, carried out from the hive and laid tenderly on the bee-board in the warm sunshine. One bee would lick the sufferer with his tongue from head to foot; another would roll him over and over in the sunshine; and at sunset they would carry him in to his sick bed. I do not complain of want of such

sympathy among the poor. I have seen much of it in the homes of the most destitute, and witnessed personal attentions and sacrifices and services in a district surrounding Brewer's-court ragged schools, which have never been exceeded, if equalled, in the houses of the great.

6. Bees are very fond of fresh air. A hive is one of the best ventilated homes; and I have some doubt about the wisdom or success of the various arrangements made by some bee-masters for increasing the ventilation of their hives. In a hot and sultry day I have seen successive lines of bees take up their position at the mouth of the hive, and, joining the tips of their wings, work these fanners for ten minutes, and then retire and let the second parallel line come to the front and continue the same process. This example is not efficiently followed in city or cottage. People who are most careful about what they eat and drink and put into their stomachs, are utterly careless what they allow to enter their lungs. Now, the truth is, it is easier to poison a man through his lungs than through his stomach. My bees would die in a London bed-room in twelve hours.

7. Bees are very early risers. The first ray of sunshine is their matin bell, and by seven o'clock P.M. they are most of them at home. People that live long and are healthy differ in many of their habits, but generally agree in being

early risers. Early light has sanitary as well as photographic influences, which post-meridian light is a stranger to. "Early to bed and early up" is an admirable maxim —an axiom among bees, and it should be a habit among rational men.

8. Bees are peaceful and peacemakers. This will appear a hasty statement to all who remember that bees have stings. But a little thought will justify what I say. Bees never give way to aggressive warfare. They never attack those who do not attack their queen or their homestead. Their stings are purely defensive. This is a very curious fact, and very suggestive also. If they had no stings at all, they would be an argument for the Peace Society. But as it is, they prove that the best defence of home is a good preparation to repel the aggressor. When, therefore, Mr. Bright preaches the duty of breaking up the navy and disbanding the army, it would be the conduct of a great hornet impressing on bees the duty of extracting their stings. Were the bees such simpletons as to listen to his plausible logic, and give up their stings, they would be surrounded by swarms of wasps, who would very soon make them give up their honey. As if to teach the bees that their weapons are to be used only in the last extremity, every bee knows that the use of his sting is followed by its inevitable loss and his destruction. It sticks where

it strikes, and the violence done to the bee ends always in death. While admiring Mr. Bright's love of peace, I hope every bee-keeper in England will prefer the bees' way of maintaining it. So sweet and short is a bee-master's sermon.

I think I have shown in these letters that morals, money, country, and enjoyment may all be helped a little by keeping bees; and, therefore, that I have done some good by directing attention to these "great and marvellous works" of One who still gives his care to a bee-hive and to Buckingham Palace.

I am, Sir, your obedient servant,

A BEE-MASTER.

Tunbridge Wells.

VIII.—BEE-THINGS IN GENERAL

AS this work does not profess to be an entomological essay but a practical bee-master's directory, I have omitted those erudite questions about which apiarians wrangle, and unfortunately lose their temper and employ their stings.

But there are some interesting bits of instruction scattered over bee-books which it may interest the reader to lay before him. If they contribute nothing to the amount of the honey harvest, they may increase the pleasure of the bee-master in the long winter evenings.

THE INSTINCT OR INTELLIGENCE OF BEES.

Huber relates:—

"He put under a bell-glass about a dozen humble-bees, without any store of wax, along with a comb of about ten silken cocoons, so unequal in height that it was impossible the mass should stand firmly. Its unsteadiness disquieted the humble-bees extremely. Their affection for their young led them to mount upon the cocoons for the sake of imparting warmth to the inclosed little ones, but in attempting this the comb tottered so violently that the scheme was almost impracticable. To remedy this inconvenience, and to make the comb steady, they had recourse to a most ingenious expedient. Two or three bees got upon the comb, stretched themselves over its edge, and with their heads downwards fixed their fore-feet on the table upon which it stood, whilst with their hind-feet they kept it from falling. In this constrained and painful posture, fresh bees relieving their comrades when weary, did these affectionate little insects support the comb for nearly three days. At the end of this period they had prepared a sufficiency of wax, with which they built pillars that kept it in a firm position; but, by some accident afterwards, these got

displaced, when they had again recourse to their former manœuvre for supplying their place; and this operation they perseveringly continued, until M. Huber, pitying their hard task, relieved them by fixing the object of their attention firmly on the table."

Lardner quotes from Kirby the following curious illustration of the habits of the clothier-bee:—

"Kirby mentions the example of nests of this kind found by himself and others, constructed in the inside of the lock of a garden-gate.

"A proceeding has been ascertained on the part of these insects in such cases, which it is extremely difficult to ascribe to mere instinct, independent of some intelligence. Wherever the nest may be constructed, the due preservation of the young requires that until they attain the perfect state, their temperature should be maintained at a certain point. So long as the material surrounding their nest is a very imperfect conductor of heat, as earth or the pith of wood is, the heat developed by the insect, being confined, is sufficient to maintain its temperature at the requisite point. But if, perchance, the mother-bee select for her nest any such locality as that of the lock of the gate, the metal, being a good conductor of heat, would speedily dissipate the animal heat developed by the insect,

and thus reduce its temperature to a point incompatible with the continuance of its existence. How then does the tender mother, foreseeing this, and consequently informed by some power of the physical quality peculiar to the metal surrounding the nest, provide against it? How, we may ask, would a scientific human architect prevent such an eventuality? He would seek for a suitable material which is a non-conductor of heat, and would surround the nest with it. In fact, the very thing has occurred in a like case in relation to steam-engine boilers. The economy of fuel there rendered it quite as necessary to confine the heat developed in the furnace, as it is to confine that which is developed in the natural economy of the pupa of the bee. The expedient, therefore, resorted to is to invest the boiler in a thick coating of a sort of felt, made for the purpose, which is almost a non-conductor of heat. A casing of sawdust is also used in Cornwall for a like purpose. By these expedients the escape of heat from the external surface of the boiler is prevented.

"The bee keeps its pupa warm by an expedient so exactly similar, that we must suppose that she has been guided either by her own knowledge, or by a power that commands all knowledge, in her operations. She seeks certain woolly-leaved plants, such as the *stachys lamata*

or the *agrostemma coronaria*, and with her mandibles scrapes off the wool. She rolls this into little balls, and carrying it to the nest, sticks it on the external surface by means of a plaster, composed of honey and pollen, with which she previously coats it. Thus invested, the cells become impervious to heat, and consequently all the heat developed by the little animal is confined within them.

"The name of *upholsterers* has been given by Kirby to certain species of bees, who, having excavated their nest in the earth, hang its walls with a splendid coating of flowers and leaves. One of the most interesting of these varieties is the *megachile papaveris*, which has been described by Reaumur. It chooses invariably for the hangings of its apartments the most brilliant scarlet, selecting as its material the petals of the wild poppy, which the insect dexterously cuts into the proper form.

"Her first process is to excavate in some pathway a burrow cylindrical at the entrance, but enlarged as it descends, the depth being about three inches. After having polished the walls, she next flies to a neighbouring field, where she cuts out the oval parts of the poppy blossoms, and seizing them between her hind legs returns with them to her cell. Sometimes it happens that the flower from which she cuts these, being but half-blown, has a wrinkled petal. In that case she spreads out the

folds, and smoothes away the wrinkles, and if she finds that the pieces are too large to fit the vacant spaces on the walls of her litile room, she soon reduces them to suitable dimensions, by cutting off all the superfluous parts with her mandibles. In hanging the walls with this brilliant tapestry she begins at the bottom, and gradually ascends to the roof. She carpets in the same manner the surface of the ground round the margin of the orifice. The floor is rendered warm sometimes by three or four layers of carpeting, but never has less than two.

"Our little upholsterer having thus completed the hangings of her apartment, fills it with a mixture of pollen and honey to the height of about half an inch. She then lays an egg in it, and wraps over the poppy lining, so that even the roof may be furnished with this material. Having accomplished this, she closes the mouth of the nest.*

"It is not every insect of this class which manifests the same showy taste in the colours of their furniture. The species called *leaf-cutters* hang their walls in the same way, not with the blossoms but the leaves of trees, and more particularly those of the rose-tree. They differ also from the upholsterer described above, in the

* Reaumur, vi. 139 to 148.

external structure of their nests, which are formed in much longer cylindrical holes, and consist of a series of thimble-shaped cells, composed of leaves most curiously convoluted. We are indebted likewise to Reaumur for a description of the labours of these.

"The mother first excavates a cylindrical hole in a horizontal direction eight or ten inches long, either in the ground or in the trunk of a rotten tree, or any other decaying wood. She fills this hole with six or seven thimble-shaped cells, composed of cut leaves, the convex end of each fitting into the open end of the other. Her first process is to form the external coating, which is composed of three or four pieces of larger dimensions than the rest, and of an oval form. The second coating consists of portions of equal size, narrow at one end, but gradually widening towards the other, where the width equals half the length. One side of these pieces is the serrated edge of the leaf from which it was taken, which, as the pieces lap over each other, is kept on the outside, the edge which was cut being within.

"The little animal next forms a third coating of similar material, the middle of which, as the most skilful workman would do in a like case, she places over the margins of those that form the first side, thus covering and strengthening the junctions by the expedient which

mechanics call a break-joint. Continuing the same process, she gives a fourth and sometimes a fifth coating to her nest, taking care at the closed end, or narrow extremity of the cell, to bend the leaves so as to form a convex termination.

"After thus completing each cell, she proceeds to fill it to within the twentieth of an inch of the orifice with a rose-coloured sweetment made of the pollen collected from thistle-blossoms mixed with honey. Upon this she lays her egg, and then closes the orifice with three pieces of leaf, one placed upon the other, concentrical and also so exactly circular in form, that no compasses could describe that geometrical figure with more precision. In their magnitude also they correspond with the walls of the cell with such a degree of precision, that they are retained in their situation merely by the nicety of their adaptation.

"The covering of the cell thus adapted to it being concave, corresponds exactly with the convex end of the cell which is to succeed it; and in this manner the little insect prosecutes her maternal labours until she has constructed all the cells, six or seven in number, necessary to fill the cylindrical hole.

"The process which one of these bees employs in cutting the pieces of leaf that compose her nest, is worthy

of attention. Nothing can be more expeditious, and she is not longer about it than one would be in cutting similar pieces with a pair of scissors. After hovering for some moments over a rose-bush, as it were to reconnoitre the ground, the bee alights upon the leaf which she has selected, usually taking her station upon its edge, so that its margin shall pass between her legs. She then cuts with her mandibles, without intermission, in such a direction as to detach from the leaf a triangular piece. When this hangs by the last fibre, lest its weight should carry her to the ground, she spreads her little wings for flight, and the very moment the connection of the part thus cut off with the leaf is broken, she carries it off in triumph to her nest, the detached portion remaining bent between her legs in a direction perpendicular to her body. Thus, without rule or compass, do these little creatures measure out the material of their work into ovals, or circles, or other pieces of suitable shapes, accurately accommodating the dimensions of the several pieces of these figures to each other. What other architect could carry impressed upon the tablet of his memory such details of the edifice which he has to erect, and, destitute of square or plumb-line, cut out his materials in their exact dimensions without making a single mistake or requiring a single subsequent correction?

"But of all the varieties of this insect, that of which the architectural and mechanical skill is transcendently the most admirable is the *bee-hive.*' The most profound philosopher, says Kirby, equally with the most incurious of mortals, is filled with astonishment at the view of the interior of a bee-hive. He beholds there a miniature city. He sees regular streets, disposed in parallel directions, and consisting of houses constructed upon the most exact geometrical principles, and of the most symmetrical forms. These buildings are appropriated to various purposes. Some are warehouses in which provisions are stored in enormous quantities; some are the dwellings of the citizens; and a few of the most spacious and magnificent are royal palaces. He finds that the material of which this city is built is one which man with all his skill and science cannot fabricate, and that the edifices which it is employed to form are such that the most consummate engineer could not reproduce, much less originate; and yet this wondrous production of art and skill is the result of the labour of a society of insects so minute, that hundreds of thousands of them do not contain as much ponderable matter as would enter into the composition of the body of a man. *Quel abîme aux yeux du sage qu'une ruche d'abeilles! Quelle sagesse profonde se cache dans cet abîme! Quel philosophe osera*

le sonder! Nor has the problem thus solved by the bee yet been satisfactorily expounded by philosophers. Its mysteries have not yet been fathomed. In all ages naturalists and mathematicians have been engrossed by it, from Aristomachus of Soli and Philiscus the Thracian, already mentioned, to Swammerdam, Reaumur, Hunter, and Huber of modern times. Nevertheless, the honeycomb is still a miracle which overwhelms our faculties."

Kirby writes:—

"Besides the saving of wax effected by the form of the cells, the bees adopt another economical plan suited to the same end. They compose the bottoms and sides of wax of very great tenuity, not thicker than a sheet of writing-paper; but as walls of this thickness at the entrance would be perpetually injured by the ingress and egress of the workers, they prudently make the margin at the opening of each cell three or four times thicker than the walls. Dr. Barclay discovered, that though of such excessive tenuity, the sides and bottom of each cell are actually double, or in other words, that each cell is distinct, separate, and in some measure an independent structure, agglutinated only to the neighbouring cells; and that when the agglutinating substance is destroyed, each cell may be entirely separated from the rest. This,

however, has been denied by Mr. Waterhouse, and seems inconsistent with the account given by Huber, hereafter detailed; but Mr. G. Newport asserts, that even the virgin-cells are lined with a delicate membrane."

Dr. Bevan relates of Mr. Knight, an acute and accurate apiarian :—

"On one occasion he observed from twenty to thirty bees paying daily visits to some decayed trees, about a mile distant from his garden; the bees appeared to be busily employed in examining the hollow parts, and particularly the dead knots around them, as if apprehensive of the knots admitting moisture. In about fourteen days these seeming surveyors were followed by a large swarm from his apiary, which was watched the whole way, till it alighted in one of these cavities. It was observed to journey nearly in a direct line from the apiary to the tree. On several similar occasions the bees selected that cavity which Mr. Knight thought best adapted to their use."

"Insects give proofs without number of the possession of the faculty of memory, without which it would be impossible to turn to account the results of experience. Thus, for example, each bee, on returning from its excursions, never fails to recognise its own hive, even though

that hive should be surrounded by various others in all respects similar to it.

"This recognition of home is so much the more marked by traces of intelligence rather than by those of instinct, inasmuch as it depends not on any character merely connected with the hive itself, whether external or internal, but from its relation to surrounding objects; just as we are guided to our own dwellings by the recollection of the particular features of the locality and neighbourhood. Nor is this faculty in the bee inferred from mere analogies; it has been established by direct experiment and observation. A hive being removed from a locality to which its inhabitants have become familiar, they are observed, upon the next day, before leaving for their usual labours, to fly around the hive in every direction, as if to observe the surrounding objects, and obtain a general acquaintance with their new neighbourhood.

"The queen in like manner adopts the same precaution before she rises into the air, attended by her numerous admirers, for the purpose of fecundation."—*Lardner.*

"The attention," says Lord Brougham,* "which has been paid at various times to the structure and habits of the bee, is one of the most remarkable circumstances in

* Vol. i. pp. 333-36.

the history of science. The ancients studied it with unusual minuteness, although being, generally speaking, indifferent observers of fact, they made but little progress in discovering the singular economy of this insect. Of the observations of Aristomachus, who spent sixty years, it is said, in studying the subject, we know nothing; nor of those which were made by Philissus, who passed his life in the woods, for the purpose of examining this insect's habits; but Pliny informs us that both of them wrote works upon it. Aristotle's three chapters on bees and wasps* contain little more than the ordinary observations, mixed up with an unusual portion of vulgar and even gross errors. How much he attended to the subject is, however, manifest from the extent of the first of these chapters, which is of great length. Some mathematical writers, particularly Pappus, studied the form of the cells, and established one or two of the fundamental propositions respecting the economy of labour and wax resulting from the plan of the structure. The application of modern naturalists to the inquiry is to be dated from the beginning of the eighteenth century, when Maraldi examined it with his accustomed care; and Reaumur afterwards, as we have seen, carried his investigations much farther. The interest

* Hist. An., lib. ix., cap. 40, 41, 42.

of the subject seemed to increase with the progress made in their inquiries; and about the year 1765 a society was formed at Little Bautzen in Upper Lusatia, whose sole object was the study of bees. It was formed under the patronage of the Elector of Saxony. The celebrated Schirach was one of its original members; and soon after its establishment he made his famous discovery of the power which the bees have to supply the loss of their queen, by forming a large cell out of three common ones, and feeding the grub of a worker upon royal jelly; a discovery so startling to naturalists, that Bonnet, in 1769, earnestly urged the society not to lower its credit by countenancing such a wild error, which he regarded as repugnant to all we know of the habits of insects; admitting, however, that he should not be so incredulous of any observations tending to prove the propagation of the race of the queen-bee without any co-operation of a male,* a notion since shown by Huber to be wholly chimerical. In 1771 a second institution, with the same limited object, was founded at Lauter, under the Elector Palatine's patronage, and of this Riem, scarcely less known in this branch of science than Schirach, was a member.

"The greatest progress, however, was afterwards made

* Œuvres x., 101, 104.

by Huber, whose discoveries, especially of the queen-bee's mode of impregnation, the slaughter of the drones or males, and the mode of working, have justly gained him a very high place among naturalists. Nor are his discoveries of the secretion of wax from saccharine matter, the nature of propolis, and the preparation of wax for building, to be reckoned less important. To these truths the way had been led by John Hunter, whose vigorous and original genius never was directed to the cultivation of any subject without reaping a harvest of discovery."

Bee Industry.

"The industry of the bee may be estimated by the average number of its daily excursions from the hive to collect provisions. According to Reaumur, if the total number of excursions be divided by the total number of bees in a hive, the average number daily made by each bee would be from five to six. But as one-half of the bees are occupied exclusively with the domestic business of the society, either in nursing and tending the young, packing and storing the provisions, or constructing the combs, the total number of excursions must be divided, not between the whole, but between only half the total number of bees, which would give ten excursions to each individual of the collecting class; and if the average

length of each excursion be taken at three-quarters of a mile, this would give the average distance travelled by each collector as fifteen miles! It is estimated by Kirby that the quantity of ponderable matter thus transported exceeds a hundred pounds."

The Rev. Mr. Wood, in his little manual—the most sensible of its size that has yet appeared—writes:—

"No noticeable capital is required to commence; no noticeable amount of time is *necessarily* consumed in their management, and they may be kept almost anywhere, though not with equal profit. One apiarian, whose authority may be depended upon, gives the profits of eight stocks only as averaging about 20*l.* in three successive years. Another, who was regularly engaged from six to six daily in other avocations, cleared nearly 100*l.* in one year by his bees. The quantity of honey that may be obtained from a hive is exceedingly variable, but offering, therefore, only the greater assurance of due rewards for able management. Fifty or sixty pounds have not unfrequently been obtained from a single hive in a season, and occasionally as much as 100 lbs.; whilst from a set of collateral boxes, 100 lbs. is mentioned; and Cotton states that as much as 210 lbs. have really been stored in a single

season, by a single stock similarly situated in a roomy trebled habitation. The prices of honey in London are stated to be generally as follows :—

		s.	*d.*
Minorca, which is the best	per lb.	2	6
Narbonne	,,	2	0
Pure native honey in the comb.....	,,	1	0
Other native honey	,,	0	8

" But pure native honey in the comb, obtained in glasses, is sought for the table, and therefore often sells for double the price above-mentioned. We shall only add, that Mr. Smart, a well-known apiarian, considers *hundreds of stocks* may be kept where only tens are now to be found, so far as regards the capabilities of support, the main point to be considered. To that subject, therefore, we now turn."

A rather exaggerated account of the excellence of honey is given by Butler :—

" Honey cutteth and casteth up phlegmatic matter, and therefore sharpeneth the stomachs of them which by reason thereof have little appetite ; it purgeth those things which hurt the clearness of the eyes ; it nourisheth very much ; it breedeth good blood ; it stirreth up and preserveth natural heat, and prolongeth old age ; it keepeth all things uncorrupt which are put into it ; and

therefore physicians do temper therewith such medicines as they mean to keep long."

In an article in the *Quarterly Review* it is stated :—

"In such esteem was it held, that one of the old Welsh laws ran thus :—'There are three things in court which must be communicated to the king before they are made known to any other person :—1st. Every sentence of the Judge. 2nd. Every new song. 3rd. Every cask of Mead.' Queen Bess was so fond of it, that she had some made for her own especial drinking every year; and Butler, who draws a distinction between Mead and Metheglin, making Hydromel the generic term, gives a receipt for the latter and better drink, the same used by 'our renowned Queen Elizabeth of happy memory.'"

A PRAIRIE HUNT.

A bee-hunt in the prairies is thus described by Washington Irving :—

"We had not been long in the camp, when a party set out in quest of a bee-tree, and being curious to witness the sport, I gladly accepted an invitation to accompany them. The party was headed by a veteran bee-hunter, a

tall lank fellow in homespun garb, that hung loosely about his limbs, and a straw hat, shaped not unlike a bee-hive ; a comrade, equally uncouth in garb, and without a hat, straddled along at his heels, with a long rifle on his shoulder. To these succeeded half-a-dozen others, some with axes, and some with rifles ; for no one stirs from the camp without fire-arms, so that he may be ready either for wild deer or wild Indian. After proceeding some distance, we came to an open glade on the skirts of the forest. Here our leader halted, and then advanced quietly to a low bush, on the top of which I perceived a piece of honey-comb. This, I found, was the bait or lure for the wild bees. Several were humming about it, and diving into its cells. When they had laden themselves with honey, they would rise up in the air, and dart off in one straight line, almost with the velocity of a bullet. The hunters watched attentively the course they took, and then set off in the same direction, stumbling along over twisted roots and fallen trees, with their eyes turned up to the sky. In this way they traced the honey-laden bees to their hive, in the hollow trunk of a blasted oak, where, after buzzing about for a moment, they entered a hole about sixty feet from the ground. Two of the bee-hunters now plied their axes vigorously at the foot of the tree, to level it with the ground. The

mere spectators and amateurs, in the meantime, drew off to a cautious distance, to be out of the way of the falling of the tree and the vengeance of its inmates. The jarring blows of the axe seemed to have no effect in alarming or agitating this most industrious community. They continued to ply at their usual occupations—some arriving full-freighted into port, others sallying forth on new expeditions, like so many merchantmen in a money-making metropolis, little suspicious of impending bankruptcy and downfall; even a loud crack, which announced the disrupture of the trunk, failed to divert their attention from the intense pursuit of gain: at length down came the tree with a tremendous crash, bursting open from end to end, and displaying all the hoarded treasures of the commonwealth. One of the hunters immediately ran up with a wisp of lighted hay, as a defence against the bees. The latter, however, made no attack, and sought no revenge; they seemed stupified by the catastrophe, and, unsuspicious of its cause, remained crawling and buzzing about the ruins, without offering us any molestation. Every one of the party now fell to, with spoon and hunting-knife, to scoop out the flakes of honey-comb with which the hollow trunk was stored. Some of them were of old date, and a deep brown colour; others were beautifully white, and

the honey in their cells was almost limpid. Such of the combs as were entire were placed in camp-kettles, to be conveyed to the encampment; those which had been shivered in the fall were devoured upon the spot. Every stark bee-hunter was to be seen with a rich morsel in his hand, dripping about his fingers, and disappearing as rapidly as a cream-tart before the holiday appetite of a schoolboy. Nor was it the bee-hunters alone that profited by the downfall of this industrious community. As if the bees would carry through the similitude of their habits with those of laborious and gainful man, I beheld numbers from rival hives, arriving on eager wing, to enrich themselves with the ruins of their neighbours. These busied themselves as eagerly and cheerily as so many wreckers on an Indiaman that has been driven on shore—plunging into the cells of the broken honey-combs, banqueting greedily on the spoil, and then winging their way full-freighted to their homes. As to the poor proprietors of the ruin, they seemed to have no heart to do anything, not even to taste the nectar that flowed around them, but crawled backwards and forwards, in vacant desolation, as I have seen a poor fellow, with his hands in his pockets, whistling vacantly and despondingly about the ruins of his house that had been burned. It is difficult to describe the bewilderment and confusion

of the bees of the bankrupt hive who had been absent at the time of the catastrophe, and who arrived, from time to time, with full cargoes from abroad. At first they wheeled about in the air, in the place where the fallen tree had once reared its head, astonished at finding all a vacuum. At length, as if comprehending their disaster, they settled down in clusters on a dry branch of a neighbouring tree, from whence they seemed to contemplate the prostrate ruin, and to buzz forth doleful lamentations over the downfall of their republic. It was a scene on which the 'melancholy Jaques' might have moralised by the hour."—*Tour in Prairies*, ch. ix.

BEE TEMPERS.

"Bees, however, as we have already observed, are not usually ill-tempered; and, if not molested, are generally inoffensive. Thorley relates, that a maid servant who assisted him in hiving a swarm, being rather afraid, put a linen cloth as a defence over her head and shoulders. When the bees were shaken from the tree on which they had alighted, the queen probably settled upon this cloth, for the whole swarm covered it, and then getting under it, spread themselves over her face, neck, and bosom, so that when the cloth was removed, she was quite a spectacle. She was with great difficulty kept from running

off with all the bees upon her. But at length her master quieted her fears, and began to search for the queen. He succeeded, and expected that when he put her into the hive the bees would follow. He was, however, in the first instance disappointed, for they did not stir. Upon examining the cluster again, he found a second queen, or probably the former one, which had flown back to the swarm. Having seized her, he placed her in the hive, and kept her there. The bees soon missed her, and crowded into the hive after her, so that, in two or three minutes, not one remained on the poor frightened girl. After this escape she became quite a heroine, and would undertake the most hazardous employment about the hives."—*Lardner.*

BEES IN THEIR CLERICAL CHARACTER.

"But connected with this, another important purpose of nature is fulfilled, which must not here pass without special notice. The principle, so fruitful in important social consequences among animals, that the offspring owes its parentage jointly to two individuals of different sexes, or, in other words, must always have a father and a mother, equally prevails in the vegetable kingdom. There also are the gentlemen and ladies, there also are the loves which unite them, loves which, as well as those of superior orders of beings, have supplied a theme for

poets. Now, among the many other interesting offices with which the Author of nature has invested the little creatures which form the subject of this notice, not the least singular is that of being the priests who celebrate the nuptials of the flowers. It is the bee literally which joins the hands and consecrates the union of the fair virgin lily and the blushing maiden rose with their respective bridegrooms. The grains of pollen which we have been describing are these bride and bridegrooms, and are transported on the bee from the male to the female flower; the happy individuals thus united in the bands of wedlock being the particular grains which the bee lets fall from its body on the flower of the opposite sex, as it passes through its blossom.

"And here we find another circumstance to excite our admiration of the wise laws of that Providence, which cares for the well-being of a little flower as much as for that of a great lord of the creation. If the bee wandered indifferently from flower to flower without selection, the gentlemen of one species would be mated with the ladies of another, hybrid breeds would ensue, and the confusion of species would be the consequence. But the bee, as knowing this, flies from rose to rose, or from lily to lily, but never from the lily to the rose, or from the rose to the lily."—*Lardner.*

GENERAL.

A popular acquaintance with the habits of bees is very important. Such an accident as the following, related in the *Scotsman* newspaper, could scarcely have occurred if the victim had learned a little on this subject:—

"On Thursday, while Dr. Bonthron, of West Linton, Peebleshire, was being driven along the road leading from Garvald to the railway station at Dolphinton, he was attacked by a swarm of bees, apparently newly 'cast-off,' and so severely stung on the face and head as to be unable to attend to his duties for the present. His face and head became dreadfully swollen and disfigured an hour or two after the occurrence, the eyes being firmly closed, and the face and throat greatly swollen and discoloured, while a considerable amount of fever has set in from the effects of the poison—in fact, but for the precautions taken, it is probable that the case would have proved fatal. The driver of the vehicle was also severely stung on several parts of the head and neck, and only escaped further mischief by a timely use of whip and rein. The queen-bee of the caste must have flown directly on Dr. Bonthron's head, from the instan-

taneousness with which he was perfectly covered by the bees: and it is supposed that the motion of the vehicle must have irritated the insects to use their stings. Upwards of thirty bee-stings were taken out of Dr. Bonthron's face, neck, and head."

Had Dr. Bonthron remained perfectly still, the bees would not have been irritated, and they would have discovered there was no room for a swarm of bees in his hat; and if the driver could have distinguished the queen-bee, and quietly removed and laid her on the hedge-side, no catastrophe would have occurred. Bees are perfectly harmless in swarming. But of course any attempt to drive them off from their queen by violence never can be made with impunity.

But in the swarming season it is most expedient that nobody but their bee-master should take any share in hiving a swarm; for so nervous are most people at the presence of ten thousand stings, that they will indiscreetly and ignorantly irritate such members of the young family as may accidentally alight on them.

A far more delightful incident is recorded by Thorley :—

"In or about the year 1717, one of my swarms settling among the close-twisted branches of some codling-trees, and not to be got into an hive without more help, my maid-servant, hired into the family the Michaelmas before, very officiously offered her assistance, so far as to hold the hive while I dislodged the bees, she being little apprehensive of what followed.

"Having never been acquainted with bees, and likewise afraid, she put a linen cloth over her head and shoulders, concluding that would be a sufficient guard, and secure her from their swords. A few of the bees fell into the hive ; some upon the ground ; but the main body of them upon the cloth which covered her upper garments.

"No sooner had I taken the hive out of her hands, but, in a terrible fright and surprise, she cried out the bees were got under the covering, crowding up towards her breast and face, which immediately put her into a trembling posture. When I perceived the veil was of no further service, she at last gave me leave to remove it. This done, a most affecting spectacle presented itself to the view of all the company, filling me with the deepest distress and concern, as I thought myself the unhappy

instrument of drawing her into so great and imminent hazard of her life, which now so manifestly lay at stake.

"It is not in my power to tell the confusion and distress of mind I was in, from the awful apprehensions it raised; and her dread and terror in such circumstances may reasonably be supposed to be much more. Every moment she was at the point of retiring with all the bees about her. Vain thought! to escape by flight. She might have left the place, indeed, but could not the company, and the remedy would have been much worse than the disease. Had she enraged them, all resistance had been vain, and nothing less than her life would have atoned for the offence. And now to have had that life (in so much jeopardy) insured, what would I not have given!

"To prevent, therefore, a flight which must have been attended with so fatal a consequence, I spared not to urge all the arguments I could think of, and use the most affectionate entreaties, begging her, with all the earnestness in my power, to stand her ground, and keep her present posture; in order to which, I gave encouragement to hope, in a little space, for a full discharge from her disagreeable companions; on the other hand, assuring her she had no other chance for her life. I was, through necessity, constantly reasoning with her, or else beseeching and encouraging her.

"I began to search among them for the queen, now got in a great body upon her breast, about her neck, and up to her chin. I presently saw her, and immediately seized her, taking her from the crowd, with some of the commons in company with her, and put them together into the hive. Here I watched her for some time, and as I did not observe that she came out, I conceived an expectation of seeing the whole body quickly abandon their settlement; but instead of that, I soon observed them, to my greater sorrow and surprise, gathering closer together without the least signal for departing. Upon this I immediately reflected, that either there must be another sovereign, or that the same was returned. I directly commenced a second search, and in a short time, with a most agreeable surprise, found a second or the same; she strove, by entering further into the crowd, to escape me, which I was fully determined against; and apprehending her without any further ceremony, or the least apology, I reconducted her, with a great number of the populace, into the hive. And now the melancholy scene began to change, and give way to one infinitely more agreeable and pleasant.

"The bees, presently missing their queen, began to dislodge and repair to the hive, crowding into it in multitudes, and in the greatest hurry imaginable. And in the space of two or three minutes the maid had not a single

bee about her, neither had she so much as one sting, a small number of which would have quickly stopped her breath.

"How inexpressible the pleasure which succeeded her past fear! What joy appeared in every countenance upon so signal a deliverance! and what mutual congratulations were heard! I never call to mind the wonderful escape without a secret and very sensible pleasure. I hope never to see such another sight, though I triumph in this most noble and glorious victory."

LETTERS FROM CORRESPONDENTS,

ADDRESSED TO

"THE TIMES" BEE-MASTER.

I HAVE selected a few of the countless letters addressed to me by those who read my letters in *The Times*, and I have appended such replies as seemed to me expedient. I have not printed several anonymous and very acrimonious letters. One writer of two anonymous letters says, his connection with the press is very great, and that in the *Saturday Review* and other periodicals he will write "scorching critiques;" that he will warn the publishers that they will earn a loss; and that he will influence *The Times* to re-

ceive no more communications. One letter has the post-mark "Ampthill;" but I suppose its real date ought to be Colney Hatch or Hanwell.

I cannot otherwise explain the extraordinary language.

But I am able to add, that the letters of the Bee-master in *The Times* have done good service; and I hope this little work will survive these threats of one or two irritable hornets.

I once thought quarrels and angry controversies were confined to ecclesiastical denominations—churches and chapels. But I have learned what I did not expect, that not a few apiarians so devoutly believe each his own patent hive to be the only way to a honey harvest, that if you do not notice it, you are denounced as ignorant of the progress of science, and if you disapprove of it, you must know nothing about bees.

I hope they will all improve in temper as they advance in experience, and agree to differ while they cease to quarrel. I have made up my mind on two or three subjects, from thought and reading,

and personal observation; and though open to argument, evidence, and facts, I am not in the least to be moved by intemperate criticism or ill-natured ridicule.

August 1st.

The "Bee-master" is respectfully requested to publish his letters to *The Times* in a pamphlet by themselves.

It is suggested that the paragraph about "Brother Ignatius" be omitted.

The "Bee-master" must have forgotten to have taken his usual allowance of honey at breakfast when he penned those harsh words.

Did he know "Brother Ignatius," he would soon discover he was

NO DRONE.

That he is no honey-bee is plain. If not a drone he must be a spider or earwig, creeping by stealth into the old Romish Benedictine hive, to which he does not really belong.

Stoke-upon-Trent, July 29th.

DEAR SIR,—I have long been hoping against hope,

and trying to persuade my friends to interest themselves in that courageous little insect, the *apis mellifica;* but the drawbacks appear to me to be rather disheartening. In the first place, the ladies dread the stings of my little friends; and in the next place, they lose the pleasure of investigation into the habits of the bees by not being enabled to procure hives that will enable one to observe the operations of the industrious little creatures. Your letter, however, in yesterday's *Times* enlightens us somewhat as to where the best-constructed hives may be obtained; and I am sure you have my hearty thanks for the information you have so kindly spread abroad through the medium of *The Times*. The common straw hive may not be very conveniently "tolled" without being in mortal fear of an accident; and to destroy the bees seems very cruel and wasteful, in order to take the honey from them. For my part, I have never yet had the courage to attempt to interfere with a straw hive, nor have I ever yet destroyed one, but kept them for my amusement and observation. Last year I constructed a wooden hive—say a square box, divided in the middle by a slide—and I introduced a young swarm into it, and they soon filled the bottom half of the box. This year they have had *one* swarm only, which I have put into a newly-constructed hive with a moveable bottom and front, with glass to look through

and doors to protect the glass : the size is 12 by 14 and 16 inches, and they have very nearly filled it since they were swarmed, on the 6th June. It contains ten large parallel combs or plates, which are beautifully full of virgin honey, carefully covered with fine films of wax, to prevent it from either running out or becoming damaged, I presume, from the atmosphere. I have a small box *to fit underneath* the full one ; but I cannot induce the bees to come down by easy means—that is, by shaking the box or drumming upon it : the vibrations only cause them to run about, but they will not descend. Pray what means would you adopt to cause them to leave the spaces between the combs, and go into the lower box, to enable me to take a portion of the combs and their contents without destroying or injuring the queen or the other bees ? With regard to the box-hive first named, and which is divided in the middle by a wooden slide, which has a hole cut into its centre about 6 by 4 inches, and which was covered by a zinc slide, which I removed in June, after the swarm came from the box. In a few days after I could only observe about a dozen which had passed into the top part of the hive. I then tried to frighten them by shaking the box, in order to induce them to leave the combs in the bottom half, and pass through the hole into the top, but without success. I afterwards

reversed the box, thinking that I might induce them to descend, and so shut them out; but they would not budge an inch. I afterwards placed the box in its proper position, and closed the entrance-holes for two days, thinking by that means to cause them to ascend in order to find a way out, but without any result, save the destruction of *eight hundred* drones in those two days, from the anger of the little workers; for, as they could not go abroad to collect food, the drones cleared every comb that contained any honey, and now I can see them all as empty as when just made; so you see I am really nonplussed. Pray what would you do? for if I smoke them, they will come down, not go up; and I am afraid that brimstone or tobacco would destroy them.

Yours very faithfully,

T. H.

This family of my correspondent has been, I fear, very ill-used. Bees have a will of their own, and a way too. You may lead and draw, but you cannot, and should not, drive.

Had Mr. H. given them more barley-sugar, or ale and sugar, and practised less manipulation, I think they would have behaved as well as he could wish.

Stamford, July 29th.

SIR,—I feel compelled to ask you to answer one or two queries of mine, for without answers I shall be unable to follow out your admirable instructions in the letter of yesterday's *Times*. I can only say, that if you will take the trouble to give me a line I shall feel greatly obliged.

I am, Sir, yours faithfully,

J. B. S.

QUERIES.

1.—Which is the best plan of hiving bees?

2.—How are the bees to be persuaded to descend from the *upper* hives, so as to allow of the honey being extracted?

3.—Should the sheds face any particular aspect?

4.—Is it necessary to stop up the entrance hole to the hive in winter, when covering them up with paper?

5.—Are the hives (Ayrshire hexagonal) *bottomless?* I judge so, as they are put one on the top of the other, and the bees rise through the slits?

I fear I must own myself totally ignorant about bee-keeping, so I trust you will excuse these queries.

J. B. S.

The writer will find 1, 2, 3, answered in the body of the work. In reply to 4, No. In reply to 5, Yes.

Cheltenham, July 30th.

SIR,—I have been much interested with your letters in *The Times* about bees; and having just commenced keeping them, am anxious for further information. Your kindness in writing so fully induces me to trouble you.

I purchased a swarm on June 17th, and have them in a common straw hive. I am told by the cottager from whom I bought them (who, by the way, takes his honey by stupifying the bees with a fungus), that as mine is a late swarm (though a first), I ought not to take any honey from them this season; but noticing in your letter of 27th your mode of obtaining honey from a straw hive by cutting a hole in the top and placing a bell-glass on a board over, I shall be much obliged if you will inform me if you think I might now adopt this mode, or is it too late in the season, and ought they to be left undisturbed till next season?

Will you kindly tell where the Scotch hexagonal hive is to be procured? I like your account of it so much,

that I shall certainly try it as soon as I can. Will you excuse this trouble?

I remain, Sir, yours obediently,

C. H. H.

To the Gentleman who writes in *The Times* under the signature of "A Bee-master."

If a good swarm take place in May, and in a good year, you may hopefully put on a super.

For Ayrshire hives, see p. 213.

July 30th.

SIR,—We have read your letters in *The Times* with the greatest interest, partly because we have been for some years bee-keepers on the more sensible plan of saving the little creatures' lives, and partly because we are anxious to induce our neighbours (poor cottage folks) to follow our example, and give up the disgusting smothering process. We have taken off a glass of honey weighing full twenty pounds, and have another equally well filled to remove; but should be very grateful for your advice as to the means of getting rid of the bees from the super when it is withdrawn, a part of the process not described in your letters, and one which we cannot manage without much trouble, and the murder of many insects. We use,

for stock, common straw hives, with *flat* tops, and a hole in the centre, which we cover with a piece of zinc or slate, easily removed when we wish to put on the super. But the bees always continue the comb up through this hole into the glass; then, when the latter is removed, there is always broken comb and running honey, to which the bees cling, and to which they return again and again, and we find the greatest difficulty in dislodging them.

You likewise recommend covering the stock hives in winter with paper, for warmth. Will you kindly tell us whether you consider it best to close the entrance also?

My only apology for thus intruding on you must rest on our ignorance, and on your benevolent and enlightened zeal for the good of the poor, and for the lives of the much ill-treated insects.

I am, Sir, yours obediently,

H. C.

I enclose a stamped envelope, in case you prefer writing to me rather than again to *The Times*.

Press a zinc plate between hive and super, and on removal substitute a very small empty bell bee-glass, and cover it with woollen cap. On no account close the entrance to the hive.

August 1st.

MY DEAR SIR,—I have read with much interest your letters in *The Times* respecting our little friends the bees, and as one of your many readers, I beg to thank you for your valuable hints. Will you, however, complete the matter by giving us one hint more, and that is, as to how you manage with the bees which may remain in the compartment which you remove? I have used the lateral wooden hive, but have always found a difficulty in getting rid of the bees which remained in the box which I have taken away. One year I took a lateral box full of honey, but lost it in consequence of the bees having taken it all away again. I, by the advice of a neighbouring bee-master, had it placed in a cool part of the garden. If you will kindly tell us how you manage in this respect, you will greatly oblige,

Yours, faithfully,

W. B. J.

Carry your super, or side-box, if yours is the collateral system, to a little distance from the hive. Raise one side of your box, and they will gradually escape and go home. If it be August, when wasps and corsair-bees are abroad, remove it about

7 P.M. Few, if any, thieves will arrive, and your bees will equally go home.

Or if you take it into a room or closet with a window on hinges, they will fly to the light and cover the window. Open the window smartly, and all on it will fly away. Shut it again till covered with bees, and repeat opening it. No thieves can thus get in, and your bees will all get out, if you have patience.

Stokenchurch, August 1st.

SIR,—I hope you will pardon the liberty I take in addressing you; but having read your letter in *The Times*, entitled "Bees and Bee-hives," and wishing to gain information on those subjects, I venture under the circumstances to write to you.

There have been for many years a quantity of bees under some leads that cover a bow added to this house. About eighteen years ago the leads were removed, the honey taken, the bees destroyed, and all the entrances (as was supposed) stopped up. Notwithstanding this, fresh swarms arrived in the course of the following year, forced

their entrance, and again took possession of the leads. Since then they have not been disturbed, but now my father expresses a wish to take the honey and get rid of the bees, as we suffer some inconvenience in the spring, on account of the bees entering the bedroom.

As I think it a pity that all the bees should be destroyed, and also have a great wish to keep them in common hives, I should feel much obliged could you give me any information as to when and how to take the honey without destroying the bees, and to place the latter in common straw hives. I regret much that I did not see your letter in *The Times* on the "Honey Harvest," nor do I know the day it appeared, therefore I cannot refer to it. Apologising for troubling you,

I remain, yours faithfully,

A. P.

I do not think it possible to remove the bees. The only alternative is to lessen, if possible, the area and contents of their residence, and thus force them to swarm. If you can lay open their residence, you might stupify the bees with fungus smoke, and abstract a portion of their honey.

Bath, August 1st.

A lady having read in *The Times* a Bee-master's letter of the 27th July, on "Hives," would feel greatly obliged if he would inform her where the Ayrshire hexagonal hive is to be had, its price, and likewise the cost of setting up the establishment with one hive to commence with; where to obtain the best bees, and how many are necessary; and the time to commence keeping them. Would a book on Bees be of much use to a beginner? An answer will be esteemed a great favour, if not entailing too much trouble on the "Bee-master."

For Ayrshire hive, write to "Mr. Bruce Taylor, Post-office, Mauchlin, Ayrshire, N.B."

Brighton, August 3rd.

SIR,—I have just been reading your excellent and interesting letter in *The Times* of this morning, and am induced to write you a second letter, having despatched one to you last week, soliciting you to be kind enough to reply to my queries and inquiries therein contained, and not having received any reply thereto. I can readily imagine you could not answer all your correspondents,

and that your letters in *The Times* would contain the information that most of them sought. Although I have perused them with the greatest pleasure, I do not find they tell me whether you would be kind enough to sell me any of the *virgin* honey which your bees have made this year, which was the principal point I wished to have solved in my former communication. I am quite sure you are a gentleman of position, and from your language I am inclined to believe are a member of the clerical profession; and as I am unwilling to trespass unreasonably on your valuable time, I do earnestly beg, if you are unable or unwilling to sell me any of your *virgin honey of* 1864, you would be so truly obliging as to furnish me with the name and address of some respectable party in your locality or neighbourhood, on whom I could depend to purchase what I might require. I never eat "rancid London," or indeed any "butter for breakfast," or any other meal, and am not fond of "nasty greasy bacon;" but as I cannot find any substitute of which I approve but pure "virgin honey," and know not where I can procure and purchase the latter from the "grower," I am constantly obliged to eat my dry toast and bread without any agreeable addition thereto. I am exceedingly desirous to cultivate a good temper and "sweet disposition;" and if you would kindly aid me in this by

supplying my "honeyed requirements," or inform me where I can purchase what I wish for, I shall be most grateful for your reply, if it contain only the name and address of some respectable person to whom I can make application for the "pure, unadulterated, virgin honey of 1864," and for which purpose I enclose you a stamped envelope.

Hoping you will oblige me, and apologising for trespassing on your valuable time,

I remain, yours most obediently,

E. L. B.

Pure honey, taken by deprivation, and in the most charming white wax cells, may be had of Neighbour, in Holborn, London.

Sundridge, August 3rd.

To "The Times" Bee-master.

SIR,—In reference to your interesting letter on "Bees and Bee-hives," in *The Times* of last Thursday, I take leave to explain to you how I prevent tom-tits and other birds from molesting my industrious little friends, if so they should feel inclined.

I affix before the door of the hive a piece of wire-work, resembling the half of a round mouse-trap, and by this very simple means a bee is permitted to return to its house, or take wing as it pleases, without "let, stop, or stay," from your "wicked hypocrite" and his companions.

This precaution being taken, I endeavour to encourage all mischievous birds to abide with me, feeding the several tom-tits, to each of whom our gardens are so largely indebted, throughout the winter with walnuts, and even providing them with sleeping-places.

I have the honour to be, Sir,

Your very humble servant,

G. S. S.

This is a very sensible letter, and well worth the attention of every bee-master.

From the Hon. and Rev. Orlando Forrester.

Doveridge, Derby, August 26th.

SIR,—Last autumn I saved from a cruel and unnecessary death a very old stock of bees belonging to a neighbour, the parent one of all his colony, full of black

comb; I gave him seven or eight shillings for it. I fed it, and it just lived through the winter. I gave it a box on the lateral plan, which it filled with a quarter of a hundredweight of honey,—so rewarding my interference.

At the time I took my box from this stock, a neighbour destroyed two of his hives, bees, &c., for the honey (I think he will not do so ungrateful a thing another year). Happening to go into his garden the morning after, he told me he had found the queen that morning dead. On showing her to me, we found she was alive, but of course none the more lively for the sulphuring of the previous night.

I begged her, took her home, and put her under a finger-glass with a little honey. I then got down from my store-closet my box of honeycomb untouched, cut away a good bit of honey, leaving sixteen or seventeen pounds. I carried it back to its old spot, opened the communication, and soon had a good number of the little manufacturers in their old quarters. Towards night I closed the communication again, stopped them in, and carried the old hive away about fifty yards. This done, I opened the ventilator at the top of the box, and inserted the strange queen, and put the inverted finger-glass over to see the effect. They seemed in a moment

to be in a strange commotion, apparently receiving her majesty with hurrahs, as the popular candidate at an election is received.

The next morning they seemed quite satisfied, and I noticed pollen taken in, and a struggle once or twice with a drone which had remained—there may have been seven or eight of these gentlemen in my experimental colony. Of course, the carrying in pollen was soon discontinued, as there was no brood to feed; the material, weighing sixteen pounds, being all honey and wax. I also saw them active in defence of their homes against the wasps; and although some wasps contrived to enter, I have seen the bees bring out their corpses now and then since, showing that they appear right.

To-day, the sun shining very bright and the temperature being warm, I am flabbergasted by seeing crowds of drones going in and out, and no slaughtering of these now unnecessary mouths. I say, can all be right? Is the queen still alive? My little friends fight the wasps, and go in and out; but what meaneth this crowd of drones?

Will you excuse my putting my case to you? for I am a lover of bees, but not very learned in the matter.

I should like to make my one cast-off stock two for next year by this artificial means, besides getting my

honey; and so be in a good position to preach to the bee-killers the folly as well as cruelty of bee-murder.

I enclose a stamped envelope, and remain, Sir,

Yours faithfully,

ORLANDO WILLIAM FORRESTER.

This is a very interesting letter. Is it possible that the drones arriving from other hives, and entering when the queen was alone, were really suitors for her majesty's choice?

I do not like artificial swarming. I prefer to follow the instinct of the bees, not to create new relations: others think otherwise.

Brighton, August 30th.

SIR,—I trust you will excuse the liberty I have taken in addressing you on purely personal matters. Your kindly, genial letters in *The Times* have induced me to do so. We wish greatly to increase a very small income, and you have so strongly advocated the care of "bees," as both remunerative and agreeable, that we wish to try on rather a large scale. I should not have troubled you on this subject, as you have intimated your intention of publishing, but that I feared the season for procuring

stock would be over before the book appeared. We wish to commence with not less than fifty hives; and, as many of the authorities we have consulted are very conflicting, I have taken the liberty of begging your aid in our dilemma. Might I trespass upon your kindness so far as to ask your opinion as to the best method of purchasing *bees;* also the best description of hives? With regard to their care during winter, and their general management, we shall doubtless be fully informed in your book.

Again apologising for thus troubling you,

I am, Sir, yours obediently,

A. A. M.

If you buy stock hives this autumn, you must see to it that—

1. They are not very old.
2. That they weigh from twenty to thirty pounds.
3. They must be transported by water, or carried one at each end of a pole on a man's shoulder.
4. Let them swarm next summer, and thus multiply your stock.
5. If you wait till spring, buy swarms, which is the best way.

Fifty swarms, gathered from cottagers, would cost 25*l.*

Begin with fewer, and increase gradually.

Faringdon, August 11th.

SIR,—I have bees in the common cottage hive, the honey of which I wish to take without destroying the bees. I am told I can fumigate them with puff-ball. I tried doing so, but killed my bees. I was afterwards told I could fumigate them with chloroform; this I also tried, but—whether the chloroform was good or bad I cannot say—I failed again.

Three or four years since I heard that a person offered a friend to take his honey for him, if he would give him the bees. The offer being accepted, the person fumigated the bees, took the honey from them for his friend, and carried the bees to his own home, where, in the end of October following, after giving them six pounds of moist sugar in ale, they contrived to fill the hive with comb and honey, and the whole weighed nearly twenty-five pounds.

Some people think it a good plan to drum the bees; but I should fear to rely on it. And if you did not

object kindly to advise me, as you have had so much experience, what plan you consider best to deprive them without destroying them, I should esteem it a very great favour; and hoping you will not consider me very impertinent in seeking your advice,

I remain yours truly,

J. H.

You must have depriving hives. You must take from the bees their surplus honey, only leaving them twenty or twenty-five pounds of honey for the winter. To take the honey out of a common skep, you must either burn the bees or leave them to perish of hunger—alternatives too barbarous to be thought of.

Gravesend.

SIR,—Having read with interest your letters in *The Times* about bees, I thought you might like to see the following extract, which I met with the other day. I always think that the cottagers waste much honey, and my husband and I have frequently thought that it might be made quite a productive source of income to them; but I fear that in these parts the plan of supers, nadirs,

&c., would be above their comprehension. If you think that clay hives are suitable to this climate, you might give a hint in *The Times.*

Obediently yours,

F. Q.

"The production of honey is one of the chief sources of wealth to this place, and the bee-hives deserve a passing notice. Each household possesses some sixteen or twenty hives, arranged with marvellous economy of space. The hive consists of a tube, of the diameter of a large gas-pipe, about four feet long, made of sun-dried clay, and laid longitudinally on the ground, four or five abreast. On these are piled, according to the wealth of the owner, a cone of twelve or fifteen more, forming a pyramid, and the whole plastered over with mud. The apertures at each end of the tubes are likewise closed with mud, leaving a small opening for the bees, exactly in the centre. A bush is stuck into the ground at each end, to shade the hives and to assist the bees in alighting. The produce of these spacious hives must be enormous; and the bees are never killed, the hives being simply robbed twice a year by the removal of the plaster at each end, when the honey is drawn out by an iron hook. All portions of comb containing young bees are carefully replaced; and on these hills, with their short winter and

abundance of aromatic herbs, nothing more is required. Of course we invested in Palestine honey, which has all the aromatic flavour of that of Hymettus or Hybla."—*Extracted from "A Winter Ride in Palestine, by the Rev. H. B. Tristram," contained in "Vacation Tourists; or, Notes on Travel in* 1862—1863."

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